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A

CATALOGUE

OF THE

ZOOPHYTES

OF

NORTHUMBERLAND AND DURHAM.

BY

JOSHUA ALDER.

FROM THE "TRANSACTIONS OF THE TYNESIDE NATURALISTS' FIELD CLUB."

Newcastle-upon-Tyne :

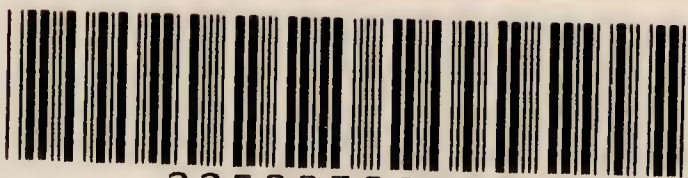
F. & W. DODSWORTH, COLLINGWOOD STREET.

1857.

D⁷ford Pamphlet

M. Percy Hedley.

Corbridge-on-Tyne.



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CATALOGUE OF ZOOPHYTES, &c.

INTRODUCTORY OBSERVATIONS.

The term "Zoophytes," as employed by different authors, has been made to embrace portions of the Animal Kingdom differing considerably in extent and characters. It may be necessary, therefore, to state that the term is here used in the same sense as by Dr. Johnston in his "History of British Zoophytes." His admirable work has been taken as the standard of reference throughout, and its arrangement and nomenclature have been, as far as possible, adhered to. When science is in a continual state of progress, however, it would be inexcusable entirely to overlook what has been done by recent authors. I have considered it necessary, therefore, to introduce some of the improvements made in the arrangement of the *Polyzoa* by Professor Busk, in his "Catalogue of the Marine Polyzoa of the British Museum." The principal alterations that have been made are in the genera *Lepralia* and *Membranipora*—genera which that gentleman has studied with great care. Dr. Johnston's genera *Cellularia* and *Flustra* have also been so far broken up as to bring together, under the genus *Bugula*, a few evidently allied species, that were divided in "British Zoophytes" between the two former genera; and having thus dismembered the *Flustridæ*, I have further adopted the genus *Carbasea* for the remaining species of *Flustra* with cells on one side only. The *Cellularia* of Johnston, containing eight species, has been distributed by Mr. Busk into seven genera. So great an innovation upon my "text book" I have not ventured in the present instance to adopt; and have, therefore, merely indicated these alterations in the synonymy.

Two or three local Catalogues of Zoophytes, each embracing a portion of the district under review, have already appeared. A pretty full list of the Zoophytes of the South of Durham was given by Mr. Hogg, in his "Natural History of the Vicinity of

Stockton-on-Tees," which appeared in 1827. This list still continues to be our chief authority for the zoophytes of that locality, and contains one or two species that have not been found further north. The principal contribution towards a knowledge of the zoophytes of our coast, however, is "A Descriptive Catalogue of the Zoophytes of North Durham," by Dr. Johnston, published in the Transactions of the Newcastle Natural History Society, in 1832, and accompanied by plates from the etchings of his accomplished lady. This Catalogue contains much original information; yet, though only twenty-four years have elapsed since its publication, it is interesting to observe how great a change this branch of natural history has undergone during the period; much of which has been effected by the distinguished author himself. The classification there adopted has become obsolete, and even the number of species recorded, which Dr. Johnston felt assured at the time would "be found by the Natural History Society of Northumberland to contain such a full list of their zoophytes as will suffice to convey an accurate view of their number and variety," has been more than trebled by subsequent researches. A list of the Hydroid species, collected by Miss Ellen Forster, at Tynemouth, in 1839, will be found in the second edition of "British Zoophytes," and the habitats of others got on the coast are incidentally noticed in the same work.

The curious researches of Sars, Dalyell, and other recent authors, leave no doubt of the intimate connexion subsisting between the Hydroid species of *Anthozoa* and the *Acalepha*; so intimate, indeed, that in many instances, individuals of the one class can only be considered as immature or transition states of the other. The union between the two classes would consequently appear to be inevitable; but, if we except a few isolated cases, too little is yet known of their embryology and metamorphoses to allow of any classification in accordance with such a view of their affinities. For the present, at least, they must necessarily be treated of apart. A difference of opinion still exists among naturalists, in cases where a species alternately assumes the characters of each class, as to which should be considered the perfect or typical form. With respect to the Medusæ

observed by Sars and Dalyell, where the ova were developed into a Hydroid Zoophyte, propagating itself in that condition by gemmation, and afterwards re-assuming the Medusoid form by fissiparous division, there would, perhaps, be little hesitation in pronouncing the Medusa to be the normal form of the species. In some zoophytes, however, the case is different. Observation has shown that the natatory progeny of *Tubularia* are the larval state of that genus, which, after swimming about for a short time in freedom, affix themselves to other bodies, and are developed into zoophytes of the parental type. Mr. W. P. Cocks has seen the same thing in the curious genus *Myriothele*; and though the young of these genera do not assume the perfect medusoid form, as in the allied genus *Coryne*, we can scarcely doubt that both partake of the same general character, and must come into the same category. The extreme delicacy and minuteness of the medusoids of the latter genus, as well as those of the *Campanulariadae*, have baffled the attempts of naturalists to trace them beyond an early stage, but in most cases they appear to have a very transitory existence. By some they are considered to be the perfect and adult state of the animal, while others take them to be merely partially developed sexual organs, endowed with a locomotive power the more readily to diffuse the ova in distant localities. The close affinity of these genera to the *Tubulariadae* and *Sertulariadae* (the embryology of both of which is known), would lead to the belief that the zoophyte will be found to be the typical form in all these families.

In the systems of most modern authors, the *Polyzoa* are removed from the *Zoophyta*, and take their rank in the sub-kingdom *Mollusca*. Their relationship with this group is established through the *Tunicata*, a kind of pseudo-molluscans, with the lower or compound forms of which they have a close affinity. Their dissimilarity to the typical *Mollusca*, however, is very striking, and I think there are several reasons that might justify us in retaining them among zoophytes, where they still hold a place in nearly all popular works on the subject. In everything that regards external form, they are truly zoophytic. Their branched and plant-like structure; their polypides issuing from

cells and surmounted by a circle of tentacles, and their ovicapsules rising from the compound body, and external to the individual—all follow the zoophytic type. It is not till we examine their internal structure that their affinity to the Mollusca becomes apparent. But admitting their near alliance with the *Tunicata*, it may be asked, Do the *Radiata* form a sub-kingdom really distinct from the *Mollusca*? When the process of development is better understood in the separate groups, it may possibly be found that there are in reality only three grand types of structure in the Animal Kingdom—the *Articulata*, the *Mollusca*, and the *Vertebrata*; the radiated forms being only lower stages of the two former—the *Echinodermata* going to the *Articulata*, with which they have many alliances, and the *Zoophyta* to the *Mollusca*. Such speculations, however, do not belong to my present humble labours. The business of the compiler of a provincial Catalogue is not to form systems, but to discriminate species, and to classify them in a way that may best facilitate their study.

Too little is known of the local distribution of zoophytes in the British seas to enable us to make any complete or satisfactory comparison of this with other localities. On the whole, the species of this class appear to be much more generally diffused, and to occupy a wider range, than is the case with most other classes of marine Invertebrata. The following species may be taken as characteristic of our north-eastern shores:—

Eudendrium rameum.	Actinia digitata.
„ confertum.	Anthea Tuediæ.
Tubularia Dumortierii.	Gemellaria loriculata.
Halecium muricatum.	Celepora Skenei.
Sertularia tricuspidata.	Bugula fastigiata.
„ fallax.	„ Murrayana.
„ filicula.	Flustra truncata.
„ fusca.	Carbasea papyrea.
Thuiaria thuia.	Eschara cribraria.
Plumularia Catherina.	Retepora Beaniana.
„ frutescens.	Alcyonidium mammillatum.
Grammaria ramosa.	Farrella pedicellata.
Pennatula phosphorea.	Avenella fusca.

Many of these range throughout the east coast of England and Scotland, but are generally rare or wanting in the south and west. The most abundant of them are *Gemellaria loriculata* and *Flustra truncata*, which are constantly brought in on the fishermen's lines. *Thuiaria thuia* and *Pennatula phosphorea* are also not uncommon.

Comparing our marine Fauna with that of the south coast of England, the most striking deficiency is found in the Asteroid and Helianthoid orders. Our shores do not produce one-fourth part of the recorded British species of *Actinia*, and several of the allied genera are entirely wanting; as are likewise all the calcareous and corticated corals. Of the more conspicuous south-country zoophytes we may note the absence of *Sertularia nigra*, *S. pinnata*, *Plumularia pennatula*, *Campanularia gelatinosa*, *Anthea cereus*, *Adamsia palliata*, *Caryophyllia Smithii*, *Membranipora Lacroixii*, *Flustra chartacea*, *Caberea Boryi*, and *Valkeria pustulata*; and the very rare occurrence of *Plumularia cristata* (only found in one instance), *Auguinaria spatulata*, *Cellularia ciliata*, *Bugula avicularia*, *Lepralia Brongniartii*, *Eschara foliacea*, and *Vesicularia spinosa*; the last, so abundant in many places, is probably rare here on account of the absence of muddy estuaries.

The number of species here given exceeds that of any other local Catalogue yet published. The reason probably is, not that zoophytes are more abundant on this coast than elsewhere, but that more attention has been paid to the minute and less conspicuous forms. The fullest list that I am acquainted with is in Couch's "Cornish Fauna," where the number described amounts to 124.* The Rev. A. Irvine's Catalogue of those found in Dublin Bay (*Nat. Hist. Review*, i. 244) contains 105 species. The other lists that I have seen (printed and manuscript) are below 100. The present Catalogue contains 164 species, of which 17, at least, are believed to be new. They belong to the following orders and families:—

* The Zoophytes recorded in Mr. Thompson's "Natural History of Ireland," vol. iv., amount to 167, but the area embraced in the Report precludes a comparison in the present instance.

ANTHOZOA.

Hydroida—Tubulariadae	...	...	15
„ Sertulariadae	...	...	30
„ Campanulariadae	...	...	18
„ Hydridae	...	...	2
			—65
Asteroida	...	...	3
Helianthoida	...	...	10
			— 78

POLYZOA.

Cyclostomata	...	...	11
Cheilostomata	...	...	54
Clenostomata	...	...	14
Pedicellinea	...	...	1
Hippocrepia	...	...	6
			— 86
			164

The principal species may be thus distributed into zones of depth.*

LITTORAL ZONE. *Clava multicornis*; *Coryne Listerii*; *Tubularia larynx*; *Sertularia pumila*; *Plumularia echinulata*; *Laomedea flexuosa*; *Campanularia Johnstoni*, *integra*; *Actinia mesembryanthemum*, *troglydites*, *coriacea*; *Lucernaria auricula*; *Eucratea chelata*; *Cellepora Hassallii*; *Lepralia verrucosa*, *unicornis*, *punctata*, *granifera*, *hyalina*; *Membranipora pilosa*, *spinifera*; *Flustrella hispida*; *Cellularia reptans*, *scruposa*; *Alcyonidium hirsutum*; *Bowerbankia imbricata*; *Valkeria uva*; *Pedicellina echinata*.

LAMINARIAN ZONE. *Tubularia indivisa*; *Sertularia operculata*, *rugosa*; *Plumularia setacea*; *Laomedea geniculata*; *Campanularia Johnstoni*, *syringa*; *Actinia coriacea*; *Lepralia coccinea*, *hyalina*; *Membranipora membranacea*, *pilosa*, *Flemingii*; *Cellularia reptans*, *scruposa*; *Bugula fastigiata*; *Flustra foliacea*, *truncata*; *Alcyonidium gelatinosum*, *hirsutum*.

* The species which contribute most to give a character to the zone have been denoted by italics.

CORALLINE ZONE. *Hydractinia echinata*; *Eudendrium rameum*, *confertum*; *Tubularia indivisa*, *gracilis*; *Halecium halecinum*, *muricatum*; *Sertularia polyzonias*, *fallax*, *abietina*, *filicula*; *Thuiaria thuia*; *Antennularia antennina*, *ramosa*; *Plumularia falcata*, *pinnata*, *Catherina*, *frutescens*; *Laomedea longissima*; *Campanularia volubilis*, *Johnstoni*, *syringa*, *verticillata*, *dumosa*; *Reticularia serpens*; *Coppinia arcta*; *Pennatula phosphorea*; *Alcyonium digitatum*; *Actinia crassicornis*, *dianthus*; *Anthea Tuediæ*, *Tubulipora patina*, *serpens*; *Cellepora pumicosa*; *Crisia eburnea*; *Gemellaria loriculata*; *Lepralia trispinosa*, *linearis*; *Membranipora Flemingii*, *unicornis*; *Cellularia scruposa*, *reptans*; *Bugula flabellata*; *Flustra foliacea*, *truncata*; *Carbasea papyrea*; *Salicornaria farciminoidea*; *Alcyonidium parasiticum*, *mammillatum*; *Farrella pedicellata*; *Avenella fusca*.

DEEP WATER. *Eudendrium rameum*; *Tubularia indivisa*, *Dumortierii*; *Halecium halecinum*, *muricatum*; *Sertularia tricuspidata*, *abietina*, *filicula*, *fusca*; *Thuiaria thuia*; *Plumularia falcata*, *Catherina*; *Campanularia volubilis*, *Johnstoni*, *verticillata*, *dumosa*, *gracillima*; *Grammaria ramosa*; *Actinia digitata*; *Tubulipora patina*, *serpens*; *Diastopora obelia*, *Alecto major*; *Cellepora pumicosa*, *ramulosa*, *Skenei*; *Lepralia reticulata*, *trispinosa*, *linearis*; *Cellularia ternata*, *Peachii*; *Bugula Murrayana*; *Eschara cribraria*; *Retepora Beaniana*; *Alcyonidium parasiticum*.

It remains for me now to express my obligations to those friends who have kindly assisted me, either by information or specimens, in the preparation of this Catalogue. My thanks are especially due to Miss Dale, of Whitburn; Mr. Hogg, of Norton House; Mr. Embleton, of Embleton; Mr. Coppin, of North Shields; and Mr. R. Howse, of South Shields. I am also greatly indebted to Professor Busk for much valuable information, which his extensive knowledge of the subject alone could supply; and to the Rev. T. Hincks for similar assistance. Nor can I omit to mention my obligations to one whose recent loss I, along with all who knew him, have had so much reason to deplore. Had Dr. John-

ston lived, his advice, ever ready, would have been greatly prized on the present occasion. As it is, this small contribution to his favourite science, and in a field where he has already done so much, can only now be offered as a tribute to his memory.

CATALOGUE.

ZOOPHYTA.

CLASS. ANTHOZOA, *Ehrenberg.*

ORDER. HYDROIDA, *Johnston.*

FAMILY. TUBULARIADÆ, *Van Beneden.*

1. CLAVA. *Gmelin.*

1. C. MULTICORNIS, *Forsk.*

Johns. Brit. Zooph., 30, t. i., f. 1—3.

In rock-pools, on stones, Fuci, and Corallines, between tide-marks; not uncommon.

2. VORTICLAVA, *nov. Gen.*

Polype linear-cylindrical or clavate, soft, naked, affixed at the base, solitary? Head terminal; tentacles in two rows, stout, dissimilar, the upper row capitate.

This genus differs from *Clava* in having the tentacles arranged in two distinct rows or whorls, forming a regular head, and in their being of two kinds. From *Hydractinia* it differs in having two rows of tentacles, as well as in the absence of an encrusting base; and from *Coryne* in not having a corneous sheath. This latter character distinguishes it also from the *Stauridia* of Dujardin, to which it appears to be nearly allied.

1. V. HUMILIS, *n. sp.* Pl. I. fig. 1—3.*

Body white, semi-transparent, nearly of equal thickness throughout: upper tentacles 5, short and stout; lower tentacles 10, about three times the length of the upper. Length of body $\frac{2}{10}$ in.

* An account of the new genera and species of this Catalogue was communicated to the British Association Meeting at Cheltenham, and has appeared partly in the "Annals of Natural History," and partly in the "Microscopical Journal."

On *Corallina officinalis*, in a rock-pool, between tide-marks, Cullercoats.

Only one specimen has yet occurred to me of this interesting little zoophyte, which may readily escape observation on account of its diminutive size. It was observed on a branch of *Corallina officinalis* that had remained for awhile in a glass of sea-water, in the autumn of 1853. The pools where it was obtained have been searched several times since for additional specimens, but without success. I am happy, however, to find that the species was also found in the same year by Mr. Busk, at Felixstowe, in Suffolk. The Cullercoats specimen, which lived with me several days, was sluggish, holding itself always in a curved position, as represented in the figure. The body is nearly cylindrical, tapering slightly towards the upper part, where it enlarges into a distinct head, having two rows of tentacles placed upon it. The mouth is tubular and prominent: the upper tentacles, which surround the mouth, are short and capitate, and generally curved inwards: the lower tentacles form a radiating circle near the base of the head; they are moderately stout, and taper slightly towards the extremity, which scarcely shows any terminal swelling, unless when much contracted. The enlarged head of the upper tentacles is permanent, and when highly magnified is seen to have a congeries of little tubercles, which probably contain thread cells. The embryology is unknown.

Mr. Peach has described, in the "Annals of Natural History" for August, 1856, the change of a zoophyte somewhat similar to this into a naked-eyed Medusa. That gentleman's observations lead him to conclude that this change was a complete metamorphosis, and not a reproduction by gemmation, as is usually the case, though the exact point of transition does not appear to have been observed.

Names given to genera in this family must be considered provisional, and subject to revision if the zoophyte should afterwards prove to be the transition state of something already known. At present this genus has as good a claim to recognition as *Clava*, and some of its nearest allies.

3. HYDRACTINIA, *Van Beneden*.1. H. ECHINATA, *Fleming*.

Johns. Brit. Zooph., 34, t. i., f. 4—6.

On old univalve shells from deep water; frequent.

4. CORYNE, *Gærtner*.1. C. LISTERII, *Van Beneden*.

Johns. Brit. Zooph., 41.

On *Corallina officinalis* and other sea-weeds, and on the sides of rock-pools, between tide-marks; not rare. Plentiful at Bamborough.

The researches of modern zoologists show the probability of several species of *Coryne* having been confounded under the name of *pusilla* (or *glandulosa*), but their characters and limits are very badly defined, and require re-investigation. The common species of our coast, which is here referred to the *Syncoryna Listerii* of Van Beneden, has the stem and branches smooth, or very faintly wrinkled, for the greater part of their course; but they are strongly annulated at the origin of each, as well as near the head. The small branchlets are ringed throughout. Where the annulations occur, the stem is generally a little constricted. The heads are moderately small, with four or five imperfect rows of tentacles. The medusoid young, obtained at Bamborough, agrees with that figured by Dujardin for his *Syncoryna decipiens*, and of Sars for *S. Sarsii*, but differs from what Mr. Gosse considers the Medusoid of *C. pusilla*. Dr. Johnston thinks this species is probably the true *C. pusilla*, but Gærtner's figure, as copied by Blainville, resembles rather *C. ramosa*, and I am not sure that Lister's should not be referred to the same. The *Syncoryna pusilla* of Van Beneden is a different and smaller species.

2. C. RAMOSA, *Ehr*.

Johns. Brit. Zooph., 42, t. vi., f. 4—7.

In rock-pools below the Spanish Battery, Tynemouth—
Mr. R. Howse.

Dr. Johnston considers this to be the *Tubularia muscoides* of Linnæus, an opinion which, I think, is open to doubt. Besides

these two forms of *Coryne*, I have obtained, at different times, another form, apparently a species (Pl. VII., fig. 1, 2) on old crusted shells of *Fusus antiquus*, from deep water, at Cullercoats. Should it prove distinct, I would propose for it the name of *Coryne pelagica*. Very short horny tubes rise at intervals from a creeping stem, and are sharply annulated by ridges of growth; the last formed portion springing from within the other in a cup-like form. The polypes are much elongated, and nearly cylindrical, swelling a little at the end, with the tentacles numerous and very short, set in seven or eight imperfect rows. Height scarcely the tenth of an inch. This is perhaps the *Coryne pusilla*, var. γ of Lieut. Thomas (Johns. Brit. Zooph., 467), of which he says, " γ deep sea; heads pink, subcylindrical—Yorkshire. The polypidom of this species closely resembles the creeping variety of *C. dumosa*." This form also comes near to the *Coryne sessilis* of Gosse (Devon. Coast. 208, t. xiv, f. 1—3), but it differs in the shortness of the arms, and in the character of the horny tube. Mr. Gosse obtained his species within tide-marks.

5. EUDENDRIUM, *Ehrenberg*.

1. E. RAMEUM, *Pallas*.

Johns. Brit. Zooph., 45, t. v., f. 1, 2.

Tubularia ramosa, *ibid*, in Newc. N. H. Trans. v. 2, 253, t. 10.

Not unfrequently brought in on the fishing lines at Cullercoats and Whitburn; also got from the five-men boats.

According to Sir John Dalyell the reproductive capsules of this species are of two kinds (probably sperm and ovicapsules). Those I have met with form a cluster round the base of the tentacles, and are arranged in a linear or moniliform series, two or three on each pedicle.

2. E. RAMOSUM, *Linn*.

Johns. Brit. Zooph., 46, t. vi., f. 1—3.

In the coralline zone, Cullercoats; rare.

3. E.? CONFERTUM, *n. sp.* Pl. I., fig. 5—8.

Polype white or pale flesh-coloured, with a longish ovate

head, surrounded by a single row of tentacles. *Polypary* tubular, yellowish horn-coloured, strongly wrinkled across but not annulated, slightly branched and expanding a little towards the apertures; base a densely reticulated and closely adhering crust. Height $\frac{1}{4}$ to $\frac{1}{2}$ an inch.

On old shells of *Buccinum undatum* and *Fusus antiquus* from deep water, Cullercoats.

This little zoophyte appears to have been first noticed by Dr. Johnston, though he had subsequently overlooked or forgotten it, as he has not introduced it into his "British Zoophytes;" and when I sent him the description of a specimen got at Cullercoats in 1854, he wrote me that it was something he was unacquainted with. I have since, however, found in his "Catalogue of the Zoophytes of North Durham," published in the Transactions of the Newcastle Natural History Society, mention made of a zoophyte which is undoubtedly the same as this; and the description is so characteristic, that I cannot do better than adopt it.

"I have observed," he says,* "a small Tubularia which invests old specimens of *Murex antiquus* with a dense beard-like coat, and may, possibly, be a species distinct from the above (*T. ramosa*). It is only the quarter of an inch in height, slender, horny, wrinkled, slightly and irregularly branched, the branches without rings at their origins: polypes white, furnished with a single series of obtuse tentacula, which do not seem to exceed ten in number. In this respect it agrees with *T. ramosa*, as characterised by Dr. Fleming, but differs from the specimens which I have seen, and also from Ellis's figure of it, in which the tentacula are much more numerous." The encrusting base, which Dr. Johnston does not appear to have examined, forbids our considering it the young of *Eudendrium ramosum*. The basal ramifications are corneous, and more solid than the ascending stems, rather broad, flat, and undulating in outline, forming a dense network. The spaces between the larger reticulations being nearly filled up with smaller ones, and the whole, in old specimens, apparently united by a membrane. This latter is rather difficult

* "Transactions of the Nat. Hist. Society of Northumberland, Durham, and Newcastle-upon-Tyne," ii. 253.

to detect on account of the species being very much mixed up with other parasites, especially *Alcyonidium mammillatum*. The number of tentacles is not very constant, varying with age, and occasionally reaching sixteen, but ten is the more usual number. The mouth is conical when at rest, but varies much in form, sometimes expanding into a flat disc with a wide aperture, similar to what is occasionally seen in *Hydractinia echinata*, to the polype of which this bears a strong resemblance.

Mr. Howse has favoured me with the examination of a zoophyte, parasitical on the operculum of *Fusus Norvegicus*, which is more than twice the size of this and more flexible, having much the appearance of a distinct species; but as I can find no essential difference in the form and mode of branching of the polypary (the only part remaining), it must be considered, for the present at least, to be a large variety of the same.

Another form has lately occurred to me more branched than that described above, and showing at the top of the tube a cup-like expansion, similar to what is represented by M. Van Beneden in his *E. ramosum*. The cup, though continuous with the tube, is more membranous, and soon falls off. The basal part is less ramified. I am unable to say, at present, whether this should be considered a variety or a distinct species. It may possibly be the same with that described by M. Van Beneden under the name of *E. ramosum*, but it is not the *Tubularia ramosa* of Linnaeus, of which Ellis's figure must be considered to represent the type.

4. *E. CAPILLARE*, *n. sp.* Pl. I., fig. 9—12.

Polypary minute, very slender, thread-like, a little branched, transparent, pale horn-coloured, smooth, excepting two or three faint rings near the origin of each branch. *Polypes* terminal on the upper branches, vase or pear-shaped, with a single row of eighteen or twenty long slender tentacles; reproductive capsules on separate short branches near the lower part of the stem, on clustered or verticillate pedicles, two or three capsules in linear series on each pedicle. Height $\frac{1}{2}$ inch.

Parasitical or *Antennularia ramosa*, Embleton Bay.—*R. Embleton, Esq.*

The peculiarity of this elegant and graceful little zoophyte is, that the reproductive capsules are on separate branches from the polypes, the latter always terminating the upper branches, while the former are on branches near the lower part of the stem. The moniliform mode of arrangement of the capsules, on the pedicles, is similar to what is seen in *E. rameum*, where, however, they are in union with the polypes, arranged round the base of the tentacles. A more near approach to the mode of arrangement in *E. capillare* may be found in Cavolini's *Sertolara racemosa** (*Eudendrium racemosum*), which has two kinds of reproductive capsules; one set of which are arranged in moniliform series on umbels, very closely resembling those of our species. According to Krohn (as quoted by Professor Owen), these capsules, in the Mediterranean species, are found to contain spermatozoa; and this may possibly be the case also in the present instance.

For a knowledge of this species I am indebted to Mr. Embleton, who kindly sent it to me, along with some other interesting zoophytes collected in Embleton Bay. It was fortunately preserved in spirits, so that the character of the animal could be distinctly made out; otherwise it might readily be taken for a *Coryne*.

6. TUBULARIA, *Linnæus*.

1. T. INDIVISA, *Linn.*

Johns. Brit. Zooph., 48, t. iii., f. 1, 2.

At and beyond the extreme low-water mark of spring tides, and in deep water; not uncommon.

2. T. DUMORTIERII, *Van Beneden*.

Johns. Brit. Zooph., 50, t. vii., f. 1, 2.

On shells, from the deep-water fishing boats, rather rare.—*Mr. R. Howse, and J. A. Berwick Bay.—Dr. Johnston.*

3. T. LARYNX, *Ellis and Solander*.

Johns. Brit. Zooph., 50, t. iii., f. 3.

* Pol. Mar., t. vi., f. 14.

Tubularia coronata, Abildg. in Mull. Zool. Dan. v. 4, p. 25,
t. cxli., f. 1—5.

On stones near low-water mark; frequent.

4. *T. GRACILIS*, *Harvey*.

Johns. Brit. Zooph., 52, t. iv., f. 3—5, and t. v.,
f. 3, 4?

On corallines, and other marine substances, generally on a
muddy bottom, in the coralline zone and deep water;
frequent.

The difference between this species and the last has been very imperfectly defined. The two kinds, as they occur on our coast, appear sufficiently distinct. *T. gracilis* is always found in deepish water; generally forming a mass of interlaced tubes, rising from three to three and a-half inches high. The tubes are very slender, firm (keeping their form when dry), and ringed at intervals, the intermediate spaces being quite smooth. They are irregularly branched; the branches frequently going off at right angles. The heads are large and bright orange-red, bearing the ova on branched footstalks, which, when mature, hang down like a bunch of grapes. The species I refer to *T. larynx* is of humbler growth, seldom reaching an inch and a-half in height, and more frequently, not more than an inch. It lives in rock-pools between tide-marks, forming little tufts, usually attached to stones. The tube is rather less slender than in *T. gracilis*, of thinner consistence (the sides often falling together when dry), and more annulated, the dried polypary appearing wrinkled throughout, with more distinct rings at intervals. It is simple, or very slightly branched. The ovi-pedicles are also less branched in this species than in *T. gracilis*—at least, in any specimens that I have seen; but this character depends very much on the state of maturity of the ova. The colour of them in *T. larynx* is purplish red. This species appears to me to be the true *Tubularia muscoides* of Linnæus, in which opinion I am glad to find that Professor Lovén coincides. There can be no doubt of its being the species described by Pallas, under that name.

5. *T. IMPLEXA*, *n. sp.* Pl. VII., fig. 3—6.

Tubes small, very slender, generally more or less contorted below, smooth, wrinkled, or regularly annulated beneath a smooth transparent epidermis; slightly and sub-unilaterally branched; the branches going off nearly at right angles to the stem, and a little constricted at their base. Gregarious; forming a densely tangled mass of half to three-quarters of an inch in height.

Discovered by Mr. R. Howse, on an old anchor brought in by the fishermen, from forty fathoms water, thirty miles east of Holy Island.

As the polype of this species has not been observed, its claim to a place in the genus cannot be fixed very decidedly. Its mode of branching is similar to that of the other *Tubulariæ*, but it is much smaller than any species hitherto described. The division of the tube into two coats is curious. This takes place sometimes near the base, but more frequently in the young branches, where the thin, smooth epidermis shows a strongly ringed tube within. The epidermis in dried specimens shrinks to the form of the inner tube, so as not to be distinguished from it.

7. *CORYMORPHA*, *Sars.*1. *C. NANA*, *Alder.* Pl. VII., fig. 7, 8.

Hydractinia, Johns. Brit. Zooph., 463, f. 79 *a*.

Hydractinia? (*Alder*) Gray, Catal. Radiata, Brit. Mus. 61.

From the fishing boats, Newbiggin; very rare.

Animal elongated, subclavate, tapering downwards. Head conical, varying to subglobose; the mouth surrounded by a circle of short tentacles; below these the surface is tuberculated; another circle of from fifteen to twenty long tentacles surrounds the base of the head. Body soft and flexible, transparent white, with several longitudinal opaque white lines; when fully extended it is nearly linear, but when at rest the clavate form is very distinct, tapering to a point at the base. Length half-an-inch.

Two specimens of this interesting zoophyte occurred to me

among some sea-refuse brought in by the fishing boats at Newbiggin, in June, 1843. At that time I was paying little attention to this class of animals; but observing it was something I had not seen before, I took a memorandum of it, with two or three sketches, and sent the best specimen off in sea-water to my friend, Dr. Johnston. Unfortunately it did not reach its destination in a fit state for examination; and the notice of it in "British Zoophytes," was taken from the hasty note and sketch that accompanied it. Had I been aware of Dr. Johnston's intention of publishing it, some rather more satisfactory materials might have been supplied. The species has not been again met with on this coast, but the zoophyte found by Dr. John Reid, at St. Andrew's, in 1845, and figured in "British Zoophytes," on the same page with this (p. 463, f. 79 *b*), is either this species, or one very nearly allied. It measured an inch in length. Our animal is evidently a *Corymorpha*, though no sheath was detected; but this seems a very variable character; as in several specimens of *Corymorpha nutans* that I have since met with in dredging, both in the Isle of Man, and in Cornwall, only in one instance did I observe a sheath, and this of so thin and filmy a character as not to be detected without close examination.

The *Hydra tuba* of Dalyell, *Strobila* of Sars, occurs in pools between tide-marks, at Cullercoats. As this is shown by Sir John Dalyell and M. Sars to be the undoubted progeny of a Medusa, I have not given it a regular place in this catalogue, but I cannot altogether omit to notice so interesting a form of apparent Hydroid Zoophyte, as it seems to be pretty permanent in this state. The first time I noticed it was in the autumn of 1854, when it was rather plentiful on stones in shallow rock-pools. Some specimens, preserved in a glass vase, lived several months, multiplying slowly by gemmation. They did not show any disposition to assume the Medusoid form. They were, however, left to procure their own nourishment from such animal matters as might be contained among a few small algæ and zoophytes that were in the same water. They were killed by the severe frosts of the succeeding winter. In the summer and autumn

of the following year, some of these little animals were still found inhabiting the same or neighbouring pools, but circumstances prevented my obtaining any of them for further examination. The number of tentacles varied considerably, according to age. They were capable of great extension and contraction, as was also the body, which varied much in outline at different times. There were four apertures on the disc surrounding the mouth, corresponding to the ovisacs of the Medusæ.

FAMILY. SERTULARIADÆ, *Johnston*.

8. HALECIUM, *Oken*.

1. H. HALECINUM, *Linn*.

Johns. Brit. Zooph., 58, t. viii.

Common in the coralline zone and deep water, and frequently of large size.

2. H. BEANII, *Johns*.

Johns. Brit. Zooph., 59, t. ix., f. 1, 2.

From the fishing boats, Cullercoats; rather rare: also from the five-men boats. "With vesicles on *Thuiaria thuid*, in January, 1848."—*J. Coppin, Esq*.

This species is generally parasitical. Examples have occurred to me upon *H. halecinum*, where all seemed to form one polypary, until the specimens were more carefully examined and each found to bear its characteristic ovicapsules. *H. Beanii* is more slender than *H. halecinum*, and not so regularly and stiffly branched.

3. H. MURICATUM, *Ellis and Solander*.

Johns. Brit. Zooph., 60, t. ix., f. 3, 4.

From the fishing boats at Cullercoats and Whitburn, occasionally, *J. A. Seaton*.—*J. Hogg, Esq*. "Abundant at Cullercoats in the winter months."—*J. Coppin, Esq*. A fine much-branched specimen, measuring, when fresh, 6 inches high, and nearly as much across, was obtained from the deep-water boats, and is now in the Newcastle Museum.

A *Halecium* apparently different from any of the above was

obtained at Cullercoats in 1853. A single compound stem rises in a curve to the height of five or six inches: this is very slightly branched, the branches inclining mostly to one side; the branchlets had been rather thickly set with cells, which appear also to have had a sub-unilateral character. The specimen is old, and neither cells nor vesicles remain, so that any further description of it must be left till a future and more favourable opportunity. The colour is dark brown. Its general contour somewhat resembles that of *Plumularia myriophyllum*.

9. SERTULARIA, *Linnaeus*.

* Cells distinctly alternate (*Sertularella*, Gray).

1. S. POLYZONIAS, *Linn.*

Johns. Brit. Zooph., 61, t. x., f. 1—3, and wood-cut 8 *a, b*.

On other zoophytes, shells, and sea-weeds, from beyond low water mark to deep water; not uncommon.

Var. β Johns. "Caulescent, pinnate," has occurred only once.

A variety with wrinkled cells is occasionally met with. This may be the same as Dr. Johnston considers to be a variety of *S. rugosa*, "which in habit and in the remoteness of its cells resembles *Sert. polyzonias*." There can be little doubt, however, that it belongs to this species, as I have obtained a specimen with the cells wrinkled on one side of the branch, and plain on the other. The wood-cut in Brit. Zooph. (f. 8 *c*) represents *S. tenella*.

2. S. TRICUSPIDATA, *n. sp.* Pl. II., fig. 1, 2.

Stem slender, alternately branched, twisted at intervals, and jointed above each cell: cells alternate, rather distant, smooth, exactly cylindrical, a little bent outwards, with a three-toothed rim; ovicapsules strongly ribbed across, with a narrow funnel-shaped aperture. Height 1 to 2 inches.

On other zoophytes from the deep-water or five-men boats, that supply Newcastle market with fish during the spring months; not rare.

Without a careful examination of its characters, this species might be passed over as a smaller variety of *S. polyzonias*, from which it differs in the slenderness of its proportions, in the shape of the cells, and especially in their three-toothed apertures. Mr. Busk has pointed out to me that there is a species very much resembling this found in the South Seas (the *S. Johnstoni* of Gray), of which he has kindly sent me a specimen from New Zealand. Like our species, it is tridentate; but on a careful comparison of the two, I find that the southern form differs from ours in the following particulars. It is of smaller size and more compact mode of growth; the cells are more closely set, smaller, shorter, broader at the base, and attached for a greater part of their length, besides having some peculiar rib-like thickenings of the walls that are not found in the northern species. There are likewise occasionally two or three cells together without a joint. The ovicapsules are very similar, but the aperture is not so much produced, and is conical, not funnel-shaped.

S. tricuspidata is parasitical on other zoophytes, adhering to them by a creeping, much-twisted fibre, from which stems arise at intervals to the height of one or two inches. They are slender, pale horn-coloured, rather shining, dividing dichotomously, or giving off alternate branches, which are frequently again subdivided. The branches are much constricted and more or less spirally twisted at their base; there is also a joint and oblique twist above each cell. The stem, after rising a little, occasionally lays hold of another branch of the supporting coralline, and becomes again creeping for a short distance. The cells are rather distant, cylindrical (not bulging below as in *S. polyzonias*), longer than broad, smooth, attached for about a fourth part of their length, slightly curved outwards and expanded a little at the aperture, which is strongly tridentate, appearing triangular when looked at from above: the margin is thickened by a rib. The ovicapsules are rather more cylindrical than those of *S. polyzonias*, more strongly ribbed across, and have a very narrow funnel-shaped aperture, without teeth.

Esper's Sertular. Tab. xii., called *Sertularia ericoides*, Pall., seems to represent this species.

3. *S. RUGOSA*, Linn.

Johns. Brit. Zooph., 63, t. x., f. 4—6.

Parasitical on other zoophytes from low-water mark to deep water; frequent.

4. *S. TENELLA*, n. sp. Pl. II., f. 3—6.

Minute, creeping, throwing up short unbranched, or slightly branched stems, which are slender, zig-zagged, and jointed above each cell: cells alternate, rather distant, elongate barrel-shaped, finely wrinkled across; the aperture erect, patent, squared and four-toothed. Length $\frac{1}{2}$ to 1 inch.

Sertularia rugosa, var. Johns. Brit. Zooph., 62, f. 8 c.

Parasitical on *Plumularia falcata* and other zoophytes, but not common.

This pretty little species is smaller and more delicate in all its proportions than *S. rugosa*, with which it has hitherto been confounded. The cells are more erect, narrower, and more closely and regularly ribbed or wrinkled across, the wrinkles generally rising a little opposite each angle; there are six or seven in this species—in *S. rugosa* three or four. The aperture is erect, patent, and conspicuously squared and four-toothed; in *S. rugosa* the aperture is much less prominent, and always bent outwards. The stem of *S. tenella* is slender, seldom exceeding half an inch in height, and most frequently unbranched; it is waved or zig-zagged, bearing a cell at each angle; opposite each cell there is a joint, above which the stem is much constricted, and slightly ringed or twisted. The cells are more distant than in *S. rugosa*, in this respect resembling *S. polyzonias*; but they are more slender and elongated than in either species. The aperture is closed by a quadripartite operculum, opening in segments, as in *Camp. syringa*, but here the segments are fewer, corresponding with the angles of the mouth. *S. rugosa* has a similar operculum. The ovicapsules, for a knowledge of which I am indebted to the Rev. T. Hincks, scarcely differ from those of *S. polyzonias* and *S. rugosa*, but are perhaps a little more produced at the top. The polypes appear to be yellow or orange coloured. Specimens of *S. tenella* occur in which the creeping fibre throws

out only single cells on short foot-stalks throughout its course. In this form it might be taken for a *Campanularia*,

** Cells opposite or sub-alternate, (*Sertularia*.)

5. *S. PUMILA*, *Linn.*

Johns. Brit. Zooph., 66, t. xi., f. 3, 4,

On sea-weeds and stones between tide-marks and a little beyond; common.

6. *S. ROSACEA*, *Linn.*

Johns. Brit. Zooph., 64, and wood-cut, f. 9 (not t. xi., f. 1).

On other zoophytes from deepish water; occasionally. On the sides of rocks at low-water mark, Bamborough.

This delicate little coralline is usually of a pure transparent white; the variety from low-water mark at Bamborough is pale horn-coloured.

7. *S. PINASTER*, *Ellis and Solander.*

Johns. Brit. Zooph., 71, wood-cut 12.

From deep water, Embleton Bay.—*R. Embleton, Esq.*

A few fine specimens of this rare and much controverted species, with ovicapsules, have been got by Mr. Embleton growing round the base of *Plumularia myriophyllum*. They agree very closely with the figure of Ellis and Solander, excepting that the pinnae are a little longer. It may be a question for future consideration whether the *S. Margareta* of Hassall is not this species with a proliferous growth of the ovicapsules, as it is difficult to point out any other difference between them. Judging from specimens I have seen, this abnormal growth of the capsules would appear to take place occasionally in *S. rosacea*, and also, according to Lieut. Thomas, in *S. tamarisca*. (See Brit. Zooph., 470.) This may explain the reason why *S. Margareta* has been referred alternately to each of these species.

8. *S. FALLAX*, *Johns.*

Johns. Brit. Zooph., 73, t. xi., f. 2, 5, 6.

On other zoophytes from deepish water; frequent.

This species is pure white when alive, but in drying usually assumes a dark brown colour approaching to black. The tips of the pinnæ first change to a blood-red or reddish brown, which gradually spreads downwards, and the whole soon afterwards becomes brownish black.

S. fallax, like some of its congeners, throws out tendrils, or long curved processes at the ends of the pinnæ for the purpose of clasping the stems of other zoophytes for support. The tendril, laying hold of an adjoining stem, generally turns about once round it, and then, cementing itself firmly to the support, runs a short way along the stem and gives off a fresh branch. In this way specimens are frequently found adhering at many points to *Plumularia falcata*.

A variety of this species is occasionally found much more slender than usual, and with the pinnæ longer and more branched. A fine specimen of this description, obligingly presented to me by Mrs. Naters, has much the aspect of a distinct species. It was obtained from the fishermen at Cullercoats. Plate XI., fig. 1, of "British Zoophytes" appears rather to represent this variety than *S. rosacea*.

9. *S. TAMARISCA*, *Linn.*

Johns. Brit. Zooph., 74, t. xiii., f. 2—4.

On an old fishing line; Cullercoats, June, 1850.—*J. Coppin, Esq.* Whitburn.—*Miss Dale.* Deep-water boats,—*J. A.*

10. *S. ABIETINA*, *Linn.*

Johns. Brit. Zooph., 75, t. xiii., f. 1, 1*.

On shells and stones in deep water; common.

11. *S. FILICULA*, *Ellis and Solander.*

Johns. Brit. Zooph., 76, t. xiv., f. 1, 1*.

On shells, &c., from deepish water; frequent.

Tubular fibres sometimes run out from the ends of the pinnæ in this species to a great length, apparently for the purpose of

laying hold of neighbouring corallines or other substances for support.

12. *S. OPERCULATA*, *Linn.*

Johns. Brit. Zooph., 77, t. xiv., f. 2, 2.*

On *Laminariae* and other sea-weeds, at and beyond low-water mark; common.

I have got this species alive at low-water mark at Bamboorough, but have not succeeded in doing so at Tynemouth and Cullercoats, though it is common there on the stalks of *Laminaria digitata* thrown up by the tide. It appears to live usually beyond low-water mark.

13. *S. ARGENTEA*, *Ellis and Solander.*

Johns. Brit. Zooph., 79, t. xiv., f. 3, 3,* and t. xv.

Beyond low-water mark, mostly in the Laminarian zone; not uncommon. "Exceedingly abundant on the south coast of Durham."—*J. Hogg, Esq.* "Among sea-refuse; not uncommon," Berwick Bay.—*Dr. Johnston.* Less common at Cullercoats, but the young or a small variety is often found growing on the shells of *Fusus antiquus* brought in by the fishing boats. Mr. Coppin finds them to bear ovicapsules in the winter season.

14. *S. CUPRESSINA*, *Linn.*

Johns. Brit. Zooph., 80, t. xvi.

Cullercoats; rare.—*J. Coppin, Esq.* Tynemouth.—*Miss Forster.* Seaton.—*J. Hogg, Esq.*

It is difficult to distinguish this species from the last, as the characters seem to run very much into each other.

*** Cells appressed, sub-four-rowed. (*Nigellastrum*, Oken.)

15. *S. FUSCA*, *Johns.*

Johns. Brit. Zooph., 70, wood-cuts 6, 11.

From deep water; rare. Dunstanborough.—*R. Embleton, Esq.* Cullercoats, and from the five-men boats.—*J. A.*

The position and character of the cells in this species show an approximation to the following genus.

10. THUIARIA, *Fleming*.

1. T. THUIA, *Linn*.

Johns. Brit. Zooph., 83, t. xvii. and xviii., f. 1, 2.

On shells from deep water; frequent.

2. T. ARTICULATA, *Pallas*.

Johns. Brit. Zooph., 84, t. xviii., f. 3, 4.

From deepish water; rare. Whitburn.—*Miss Dale*. Cul-
lercoats.—*J. Coppin, Esq.* Dredged in deep water, and
also cast on shore at Tynemouth.—*Miss Forster*. From
the deep-water boats.—*J. A.*

11. ANTENNULARIA, *Lamarck*.

1. A. ANTENNINA, *Linn*.

Johns. Brit. Zooph., 86, t. xix., f. 1, 3.

From the coralline zone and deep water; frequent.

2. A. RAMOSA, *Lamk*.

Johns. Brit. Zooph., 88, t. xx.

On shells and stones in the same situations as the last, but
less common. Not unfrequent at Seaton.—*J. Hogg, Esq.*

Much difference of opinion has existed concerning the distinct-
ness of these two species of *Antennularia*, arising from an imper-
fect examination of their minute characters. As might be
expected from their general appearance and habit, the species are
undoubtedly distinct, though some confusion has arisen from an
erroneous character being fixed upon for dividing them. The
absence of the small *tubulæ*, or trumpet-shaped processes between
the cells, has been pointed out as distinguishing *A. ramosa* from
A. antennina; but the fact is that the tubules exist in both spe-
cies, and exactly in the same number and position, as I have
satisfied myself by a careful examination of specimens both from
our own coast and from the south of England; those of *A. ramosa*
being generally a little smaller and tapering more at the base.

A more reliable character will be found in the number of joints in the branchlets. In *A. antennina* there are always two joints between the cells throughout; in *A. ramosa* only one on the lower and principal part of the branchlet, increasing to two near the top. The internodes in the latter species are also longer and straighter, as may be seen in the magnified figures in "British Zoophytes," t. xix. and xx., where the tubules are likewise represented in each, though the number is deficient. In perfect specimens these are arranged in the following order:—1 below the cell, 2 abreast at the upper angle of the cell, and 1 at a little distance above: this last is on the same internode in *A. ramosa*, and on the intervening or non-celliferous internode in *A. antennina*. Besides these, there are two large tubules (one on each side) at the base of the branchlets, where they join the stem; and in *A. ramosa*, two smaller ones in front and one a little way up the stem. I have not observed these latter in *A. antennina*, though they may possibly be found in luxuriant specimens.

A. ramosa, then, may be distinguished from *A. antennina* by its branched stem, and by the branchlets being long, straight, and tapering, with only a single joint between the cells for the greater part of their length. The branchlets of *A. antennina* are short, stunted, and curved inwards, with two joints between each cell throughout.

12. PLUMULARIA, *Lamarck*.

1. *P. FALCATA*, *Linn.*

Johns. Brit. Zooph., 90, t. xxi., f. 1, 2.

On shells and stones in the coralline zone, and in deep water; very common.

2. *P. CRISTATA*, *Lamk.*

Johns. Brit. Zooph., 92, t. xxiii. f. 1—3, and woodcut 16.

A single specimen has been found on *Fucus siliculosus* in Whitburn Bay, by Miss Dale.

3. *P. PINNATA*, *Linn.*

Johns. Brit. Zooph. 95. t. xxi. f. 4, 5.

On shells, &c., from low-water mark to deep water; not uncommon.

Deep-water specimens of this beautiful and delicate species sometimes reach the height of five or six inches on our coast.

4. *P. SETACEA*, *Ellis*.

Johns. Brit. Zooph., 97, t. xxii., f. 3—5.

On *Laminaria digitata* and other sea-weeds at low-water mark and in shallow water; frequent.

P. setacea seldom, if ever, exceeds an inch and a-half in height in this locality.

5. *P. ECHINULATA*, *Lamk.*

Johns. Brit. Zooph., 464, wood-cut 80.

On stones between tide-marks, and on the roots of *Laminaria digitata*; not rare. Cullercoats and Ryhope.

This species appears to be more widely diffused than was at first expected, but has been passed over as a small variety of one or other of the two preceding. The three species are so nearly allied that some little care is required in discriminating them. The number of joints in the stem and pinnæ, and the curious trumpet-shaped processes or tubules, afford the most reliable characters. *P. echinulata* is rather robust, compared with the other two, and is always of humble growth, scarcely rising above an inch from a strong, creeping root-fibre, on which the ovicapsules are profusely developed. It differs from *P. pinnata* in having a joint of the stem above each pinna, in which it agrees with *P. setacea*, but it differs from *P. setacea*, and agrees with *P. pinnata*, in having generally only one joint of the pinna between the cells; *P. setacea* has always two. There is now and then an additional joint developed in parts of *P. echinulata*. *P. pinnata* has one short, small tubule below each cell; *P. echinulata* has the same, but has an additional one behind and above the cell. *P. setacea* has two longish tubules below each cell (one on each joint), and two abreast behind and above the cell: there is also a tubule on each joint of the stem, on the opposite side to the pinna, which is not the case in either of the other species. When

the trumpet-shaped processes are present, they afford excellent characters, but they are frequently rubbed off in worn specimens. The capsules of *P. echinulata*, besides being developed from the creeping fibre, differ from those of *P. pinnata* in being smaller, more rounded, and more strongly echinated, but the latter character is very variable in *P. echinulata*, which appears to have led to some mistakes. Fig. 81, p. 465, of Johnston's "History of British Zoophytes," and Pl. IX., f. 26* of Landsborough's "Popular History," both called *P. setacea*, appear to have been taken from specimens of *P. echinulata*, as the pinnæ and ovicapsules show the characters of this species, and not of *P. setacea*, which has long flask-shaped capsules, developed in the axillæ of the pinnæ. Pl. XXII., f. 5, of Brit. Zooph. correctly represents the latter species, though the tubules are not well defined.

6. *P. CATHERINA*, *Johns.*

Johns. Brit. Zooph., 97, wood-cuts 1, 17.

On other zoophytes and Ascidia from deep water; frequent.

The tubules in this species are developed on the radical fibres as well as on the stem and pinnæ; those on each side of the cell are mounted on pedicles and beautifully displayed. The number in connexion with each cell is seven: three below, two at the sides, and two behind; the latter are sometimes absent.

7. *P. MYRIOPHYLLUM*, *Linn.*

Johns. Brit. Zooph., 99, t. xxiii., f. 4, 5.

A fine specimen of this species was procured in Embleton Bay by R. Embleton, Esq.

8. *P. FRUTESCENS*, *Ellis and Solander.*

Johns. Brit. Zooph., 100, t. xxiv., f. 2, 3.

From deep water; rare. Whitburn—*Miss Dale*. Hartlepool—*J. Hogg, Esq.* Cullercoats—*J. Coppin, Esq.*, and *J. A.* "From muddy bottom in forty-five fathoms off the Tees, in April, 1845, and again in March, 1846, both times with ovaries."—*Lieut. Thomas.*

FAMILY. CAMPANULARIADÆ, *Johnston*.13. LAOMEDEA. *Lamouroux*.

*Cells cup-shaped.

1. *L. DICHOTOMA*, *Linn*.

Laomedea dichotoma, var. α , Johns. Brit. Zooph., 102, t. xxvi., f. 1, 2.

Campanularia gelatinosa, Van. Ben. Campan., 33, t. i., ii.

In pools between tide-marks, Bamborough; rather rare.

South coast of Durham—*J. Hogg, Esq.*

It has become necessary to divide the *L. dichotoma* of Johnston into two species, distinguished by the character of their cells. Those of his var. α , which I take to be the true *dichotoma* of Linnæus, and the “Sea-thread coralline” of Ellis, Pl. xii., *a*, A, and Pl. xxxviii., fig. 3, has the cells rather wide, with a plain margin: this kind is found between tide marks, and appears to be the species represented by Dr. Johnston in his Pl. xxvi., fig. 2. It is common in some parts of the south of England, and is particularly abundant at Tenby; but, as far as my experience goes, it is rare in the north. I have only met with it once on our coast, and of small size. Dr. Johnston’s remark, that it is common within tide-mark, would, however, appear to imply that he found it so in Berwick Bay. What he got on branches of trees, that had been washed into the sea, probably belonged to the next species. The fishermen of our coast frequently bring in branches of trees, fished up in deep water, covered with barnacles and zoophytes, among which *L. longissima* is not uncommon.

2. *L. LONGISSIMA*, *Pallas*.

Sertularia longissima, Pallas, Elench. Zooph., 116, No. 67.

Laomedea dichotoma, var. β , Johns. Brit. Zooph., 102.

In deep water; frequent.

The species of *Laomedea*, in many of their characters, come so near to each other that it is difficult to distinguish them. This

is especially the case between this species and the last. Their mode of branching and annulation are so similar that, without seeing the cells, they might readily be pronounced to be varieties of the same. The cells of this species, however, are much deeper and narrower than the other, and are very strongly denticulated round the margin (Pl. III., fig. 4). Unfortunately, on account of their deciduous character, and the deep-water habitat of the species, it is rare to meet with a specimen that retains any vestige of them, even when got fresh from the fishing lines, on which they are frequently brought on shore. *L. longissima* (as thus distinguished) grows to a much larger size than *L. dichotoma*, and has a stronger and darker stem, which is rather more flexuose, and the branches more regularly alternate. The stem becomes black in old individuals. From this circumstance, together with its large size, there can be little doubt that this is the species described by Pallas, though he does not give the character of its cells.

Lieut. Thomas says that he finds the cells of *L. dichotoma* (*longissima*?) always crenulated; but he adds that the crenulations are shallow, and like those represented in Van Beneden's figure of *C. volubilis*,* which does not exactly correspond with my observations.

3. *L. GENICULATA*, *Linn.*

Johns. Brit. Zooph., 103, t. xxv., f. 1, 2.

On the fronds of sea-weeds, especially *Laminaria digitata*; very common.

4. *L. FLEXUOSA*, *Hincks, MS.*

Laomedea gelatinosa, var. *a*, Johns. Brit. Zooph., 104, t. xxv., f. 3, 4.

Campanularia geniculata, Van. Ben. Campan., 34, t. iii., f. 1—6.

On rocks and stones between tide-marks, and occasionally on sea-weeds; frequent.

Dr. Johnston was certainly wrong in uniting this species with

* Brit. Zooph., 466.

the *L. gelatinosa*, so admirably described by Pallas. The compound stem, sub-verticillated mode of branching, and crenulated cells of that species, at once distinguish it from the others. *L. flexuosa* is much more nearly allied to *L. geniculata*, with which it has sometimes been confounded. Their distinctive characters have been well pointed out by Dr. Johnston, and consist principally in the annulations of the stem, and the length of the pedicles. In both, the cells have a plain margin. The ovicapsule of *L. flexuosa* is much more elongated than in *L. geniculata*, and not so much constricted at the top.

5. *L. NEGLECTA*, *n. sp.* Pl. III., fig. 1, 2.

Polypary minute: stem filiform, sub-flexuose, with two or three alternate simple branches, each bearing a cell; the stem is annulated with from four to seven rings above the origin of each branch, and sometimes slightly ringed below; the branches are ringed throughout; cells narrow and deep, with alternate deep and shallow crenations, forming about eight bi-mucronated denticles round the margin. *Polype* with fifteen or sixteen slender tentacles. Height $\frac{2}{10}$ ths in.

On the under side of stones in pools between tide-marks.

Cullercoats and Tynemouth; frequent.

This delicate little *Laomedea*, though apparently not rare, has hitherto escaped observation; or, if observed, has been passed over as the young of the last, with which it is sometimes found associated on the same stone. It is, however, not very readily seen, unless the stone is examined with a magnifier. It differs from *L. flexuosa* in being of much humbler growth, more slender, and in having smaller, narrower, and deeper cells, crenulated on the margin. The crenulations are very difficult to detect on account of the extreme tenuity of the edges. In their sub-turreted character, they resemble those of *L. gelatinosa*, though the shape of the cell is different, as may be seen by reference to Pl. III., fig. 3, where a cell of *L. gelatinosa* is figured for comparison. That species has not yet been observed on this coast.

**Cells pod-shaped.

6. *L. LACERATA*, *Johns.*

Campanularia lacerata, Johns. Brit. Zooph., 111, t. xxviii., f. 3.

Laomedea lacerata, Hincks, in Ann. Nat. Hist., 2nd ser., v. 10, p. 86.

Parasitical on *Plumularia falcata* in Berwick Bay.—*Dr. Johnston.*

7. *L. ACUMINATA*, *n. sp.* Pl. III., fig. 5—8.

Polypary minute, scarcely branched; with a slender, annulated stem; the annulations strongest at the base and becoming fainter or disappearing towards the cell: cells thin, membranous, finely striated longitudinally, elongate pod-shaped, squared below, and tapering to a fine point above; the margin slightly crenulated. *Polype* reaching, when extended, to two or three times the length of the cell, with about twenty muricated tentacles, united by a web at the base. Height $\frac{1}{10}$ th inch.

On an old shell of *Fusus antiquus* from deep water, Cullercoats.

This is an extremely curious and interesting species, which one would scarcely think of referring to the genus *Laomedea*, were it not for its near alliance to the *L. lacerata*. The stem rises from a creeping fibre, and, in most of the specimens observed, bore only a single polype, but in two or three instances, a branch bearing a second polype was seen proceeding from it. The cells are extremely elastic and membranous, changing form with the polype, and scarcely to be distinguished from it when alive, excepting at the apex, when the animal is withdrawn. The polype, when extended, stretches far beyond the cell, the latter adhering closely to it and becoming cylindrical. The whole animal is very extensile, and frequently changes form. The tentacles sometimes appear short and stout, and at other times, they are extended into long and slender threads, as in the fresh-water *Hydra*, to which the animal then bears considerable resemblance. The tentacles are united by a web for about one-

sixth of their length, a circumstance I have not observed in any other species. The margin of the cell appears to be crenulated. This character, however, is difficult to ascertain. I have watched the opening of the cell several times when the polype was emerging from it, without being able to detect the exact form of the margin, which is extremely thin and membranous.

14. CAMPANULARIA, *Lamarck*.

1. *C. volubilis*, *Linn.* Pl. II., fig. 7.

Stem creeping, sometimes giving off shoots in a free state, generally spirally twisted: pedicles rather longish, spirally twisted and not ringed at the base: a single spherical ring below each cell; cells generally rather narrow and deep, with about ten shallow, blunt denticles round the margin: ovicapsules rising on short pedicles from the creeping stem, oblong flask-shaped, smooth, with a long narrow neck. Height $\frac{1}{10}$ th inch.

Sertularia volubilis, *Linn. Syst. Nat.*, 12th Ed. 1311.

Small climbing coralline with bell-shaped cups, *Ellis*.

Corall. 24, t. xiv., f. a, A.

On *Plumularia falcata*, *Sertularia fallax*, and other zoophytes from deep water; frequent.

Three or four species have hitherto been confounded under the name of *Campanularia volubilis*. It is, therefore, necessary to re-describe and discriminate them, and to ascertain, if possible, to which the Linnæan appellation properly belongs. Unfortunately the description of that author is very imperfect; but as he quotes the excellent figures of Ellis, with which his description, as far as it goes, corresponds, these may fairly be taken as representing the true *C. volubilis*. The distinguishing character of the species there represented is the spirally twisted stem; and Ellis remarks in his description, "that at the bottom of each (cup), where they join the stalk, the microscope discovers to us a very minute spherule, or little ball, as in some drinking glasses." With these characters the species here described perfectly agrees. I have for some time been satisfied that this was distinct from the *C. volubilis* of Johnston and other modern British authors, but it was

not until lately that I was so fortunate as to meet with its ovicapsules, the peculiar form of which will, I think, remove all doubt on the subject. This species is almost equally common on our coast with that described by Dr. Johnston (which I propose calling *C. Johnstoni*), but on account of its usually inhabiting deeper water, it is not so generally met with. They may, however, be occasionally found mixed together on the same zoophyte, particularly on the stem of *Plumularia falcata*; but when their peculiar characters are known, they can readily be distinguished from each other. *C. volubilis*, as here distinguished, is scarcely more than half the size of *C. Johnstoni*, and has the cells usually narrower and more cylindrical, with the crenations of the margin blunter and shallower. But the best distinguishing character is in the pedicle, which in this species is always spirally twisted throughout, though becoming less marked towards the top, where, in most cases, a single spherule only supports the cup. The creeping stem is generally, but not always, twisted when attached; but when, as is often the case, it becomes free, its spirally twisted character is beautifully displayed, and it has the appearance of a minute transparent cord, with a club-shaped termination. The pedicles and cells arising from the free part of the stem, are always shorter than where it is attached, and more nearly resemble Ellis's figure. The ovicapsules are oblong flask-shaped, smooth, compressed laterally, and produced into a very long and narrow neck: they rise from the creeping stem by short pedicles of two whorls.

2. *C. JOHNSTONI*, *n. sp.* Pl. II., fig. 8.

Stem creeping, plain; pedicles long, with numerous close-set rings at the base, and more or less ringed at the top; the middle part usually plain, but sometimes ringed; cells deep and rather large, with ten or twelve strong denticles round the rim: ovicapsules nearly sessile on the creeping stem, ovate-oblong, strongly plicated transversely, and truncated at the top. Length one and a-half to two-tenths.

Campanularia volubilis, Johns. Brit. Zooph., 107, wood-cut

18. Couch, Cornish Fauna, pt. 3, 40, t. xi., f. 1. Gosse, Ramb. Dev. Coast, 296, t. xviii.

On sea-weeds, zoophytes, shells, &c., from between tide-marks to deep water; common.

This species is of more robust growth than the last, with the cells larger and more strongly denticulated; they are also wider, but this character is rather variable in both species. The pedicles are longer and stouter, and have always numerous close-set rings at the base, and also several rings at the top; the middle part is variable, sometimes partially or even wholly ringed, but more frequently plain. There is sometimes a joint in the pedicle, in which case it is ringed* above. The creeping fibre is always plain, and seldom, if ever, detached. The ovicapsules are large, ovate or sub-cylindrical, more or less elongated, with a truncated top, and very strongly plicated transversely. They rise from the creeping stem by scarcely perceptible pedicles. Mr. Gosse has represented a spur at the bottom, which I have not observed.

It may be a question for future solution whether this species is ever branched. I have found branched specimens from deep water very much resembling this, with a ringed base to the stem and a strongly denticulated cup, which I believe to be the young of *Laomedea longissima*, having found specimens a little more advanced with the capsules of that species. In Ellis and Solander's "Zoophytes," however, a figure is given of a branched specimen under the name of *Sertularia volubilis*, with capsules resembling those of *C. Johnstoni*.

3. *C. HINCKSHI*, *n. sp.* Pl. II., fig. 9.

Stem creeping, plain: pedicles long, nearly smooth, with two or three slight spiral twists at the base, and two or three spherical rings at the top, one of which is within the cup: cells rather long, with parallel sides, wrinkled or lineated longitudinally; marginal denticles 10, of a

* It is important in this genus to distinguish between rings, with lines returning into themselves, and spiral ridges, as the distinguishing characters of the species often depend upon them.

squared or castellated form, a little indented at the top.
Height $1\frac{1}{2}$ to 2-10ths.

Campanularia volubilis, var. Hincks in Ann. Nat. Hist., 2nd Ser., v. 11, p. 180.

On shells and zoophytes from deep water; rather rare.

This species differs from the two former in the castellated form of the rim, and also in the shape of the cell, which is broader at the base and lineated longitudinally; the spherical ring within the cup is also a distinguishing character. The pedicle is long, and with the exception of one or two rings at its junction with the cell, and a slight spiral twisting at the base, it is smooth. In this respect it differs from the *C. volubilis* of Van Beneden, the cell of which, though differing in shape, has a somewhat similar castellated rim, but the pedicle is short and strongly annulated throughout. This latter will probably constitute a fourth species. The *C. Hincksii* was first noticed by Mr. Hincks, who described it in the Annals of Natural History for March, 1853, as a curious variety of *C. volubilis*, from specimens sent him by Mr. Templar from the west of England. I have since met with it sparingly from deep water on our coast. Mr. Hincks informs me that in his specimens the ovicapsules were apparently smooth, but from their imperfect state of preservation, this character was not satisfactorily made out. My specimens are without ovicapsules.

4. *C. INTEGRA*, *J. Macg.*

Johns. Brit. Zooph., 109, t. xxviii., f. 2.

On the roots of *Laminariæ* and on *Ascidix* at low-water mark, Bamborough.

5. *C. SYRINGA*, *Linn.*

Johns. Brit. Zooph., 110, wood-cut 19.

Parasitical on other corallines and on small *Fuci*; not uncommon.

6. *C. VERTICILLATA*, *Linn.*

Johns. Brit. Zooph. 112, t. xxvi., f. 3, 4.

In deepish water at Cullercoats; not rare.—*J. A.* Near Hartlepool.—*J. Hogg, Esq.*

7. *C. DUMOSA*, *Flem.*

Johns. Brit. Zooph., 113, t. xxvii., f. 2—5.

On other zoophytes, shells, and stones in deep water; common.

This species, in its free and erect state, has a robust mode of growth. Besides the two varieties mentioned by Dr. Johnston, there is another with rather smaller cells and a simple stem, which is attached only at intervals to other zoophytes, hanging from them in a festooned fashion.

8. *C. GRACILLIMA*, *n. sp.* Pl. IV., fig. 5, 6.

Stem erect, compound, sub-unilaterally branched: cells very slender, long, tubular, thin, set on loosely twisted pedicles of about two whorls: aperture entire. Height 1 in.

On shells and zoophytes from deep water; occasionally.

This is a critical species, greatly resembling *C. dumosa*, from which it can only be distinguished by comparative characters, though its general appearance and habit at once strike the eye as something distinct. It is much smaller than *C. dumosa*, thinner in texture, and more flexible when fresh, with narrower cells set on longer pedicles. The stem is erect, and generally compounded of two or three tubes, diminishing to one at the ends of the branches. It is a good deal branched; the branches often rising more from one side of the stem than the other. The cells are long, very slender, thin and transparent, with a smooth rim: they are set on pedicles about one-fourth the length of the cells, loosely twisted, and making about two turns. They generally rise at a less angle from the stem than in *C. dumosa*, and are more fragile, being very apt to fall off when dry. The cells of *C. dumosa*, on the contrary, are more persistent than in any other species of the genus. *C. gracillima* appears usually to assume the erect form; only in one instance have I observed it creeping over the surface of a shell near the base of the ascending stems.

A *Campanularia* from Bass's Straits, of which Mr. Busk has

kindly sent me a drawing, is very similar to this, if not identical.

15. RETICULARIA, *Wyville Thomson*.

1. R. SERPENS, *Hassall*.

Campanularia serpens, Hass. in Zoologist, No. 69, p. 2223. Trans. Micros. Soc., v. 3, p. 163, t. xxi., f. 4.

Reticularia immersa, Thoms. in Ann. Nat. Hist., 2nd Ser., v. 11, t. xvi., f. 2, 3.

Parasitical on the stems of *Sertularia abietina*, *Plumularia falcata*, and other zoophytes from deep water; common.

This zoophyte is very abundant on our coast. Scarcely a specimen of *Sertularia abietina* can be obtained from deep water that is not more or less invested with it. In its old state it completely covers the *Sertularia*, and the cells are so crowded that their character is not easily recognised. They are, however, perfectly distinct from the creeping stem, oblong, and attached for about one-third of their length, rising up erect towards the aperture, which is slightly expanded.

16. GRAMMARIA *Stimpson*.

“Polypidom rectilinear, elongated, cylindrical, composed of aggregated tubes, generally without branches, which, when they occur, are of the same character as that from which they spring. Cells arranged on all sides, in more or less regular and equidistant longitudinal rows, giving a section of the stem a star-like appearance.”—*Stimpson*.

1. G. RAMOSA, *n. sp.* Pl. IV., fig. 1—4.

Polypary stout, horn-coloured, irregularly branched; the branches rising from a constricted base: cells cylindrical, bending outwards to a distance nearly equalling the width of the stem, with an even margin, behind which they are frequently annulated with one or two lines of growth; they are set in about four longitudinal rows, the adjoining cells alternating, and the opposite cells

nearly on a line with each other. Height one to two inches.

From the deep-water fishing boats; rather rare.

This species comes very near to the *Grammaria robusta* of Stimpson,* of which it may possibly be a variety, the principal difference being that the British form is always much branched, while the American species is linear and straight. The genus is new to Europe, and does not appear to differ much from the *Salacia* of Lamouroux, founded on an Australian species.

17. COPPINIA, *Hassall*.

1. C. ARCTA, *Dalyell*.

Sertularia arcta, Daly. Rare and Remark. Anim. Scot., v. 1, p. 224, t. xlii.

Coppinia mirabilis, Hassall in Zoologist, No. 69, p. 2223. Trans. Micros. Soc., v. 3, p. 160, t. xxi., f. 1, 2.

Parasitical on the stems of *Sertularia abietina* and *Plumularia falcata*; frequent.

FAMILY. HYDRIDÆ, *Johnston*.

18. HYDRA, *Linnaeus*.

1. H. VIRIDIS, *Linn*.

Johns. Brit. Zooph., 121, wood-cut 28.

In ponds and still waters; common.

2. H. VULGARIS, *Pallas*.

Johns. Brit. Zooph., 122, t. xxix., f. 2.

Hancock in Tynes. Club. Trans., v. 1, p. 405, t. vii.?

In ponds, &c.; rather rare. In a pond near North Elswick.

—*J. A. Crag Lake*.—*A. Hancock, Esq.* In a stream of clear water at Norton.—*J. Hogg, Esq.*

* Synopsis of the Marine Invertebrata of Grand Manan, p. 9, t. i., f. 3

ORDER. ASTEROIDA, *Johnston*.FAM. PENNATULIDÆ, *Fleming*.19. PENNATULA, *Linnaeus*.1. P. PHOSPHOREA, *Linn*.

Johns. Brit. Zooph., 157, wood-cut 36.

From the coralline zone and deep water; frequent. Often brought in on the fishing lines at Cullercoats.

20. VIRGULARIA, *Lamarck*.1. V. MIRABILIS, *Linn*.

Johns. Brit. Zooph., 161, t. xxx.

Dredged off the Northumberland coast by R. McAndrew, Esq., in 1851.

FAMILY. ALCYONIADÆ, *Johnston*.21. ALCYONIUM, *Linnaeus*.1. A. DIGITATUM, *Linn*.

Johns. Brit. Zooph., 174, t. xxxiv.

From beyond low-water mark to deep water, on shells, stones, and other submerged bodies; very common.

The orange variety frequently occurs, sometimes on the same stone or shell with the common kind. As no intermediate stages have ever been found, there is a probability that this may prove to be a distinct species. Large specimens of the orange variety are generally divided into more numerous lobes or digitations, the substance is more coriaceous, and the spicula are somewhat stouter than in the other kind. The difference of colour also extends to the interior. Is the *A. glomeratum* of Hassall distinct from this? Another variety, almost white, spreading in a thin layer over other substances, and with the polypes more distant than usual, is sometimes met with. The margin of this is very much attenuated, and spreads for a considerable distance without polypes, which is not the usual character of young encrusting individuals of *A. digitatum*.

ORDER HELIANTHOIDA, *Johnston*.FAMILY. ACTINIADÆ, *Gray*.22. ACTINIA, *Linnaeus*.* *Actinia*, *Gosse*.1. A. MESEMBRYANTHEMUM, *Ellis and Solander*.

Johns. Brit. Zooph., 210, t. xxxvi., f. 1—3.

On rocks and stones between tide-marks; common.

* * *Sagartia*, *Gosse*.2. A. TROGLODYTES, *Johns*.

Johns. Brit. Zooph., 216, wood-cut 47.

In crevices of rocks between tide-marks; not rare. Berwick Bay.—*Dr. Johnston*. Cullercoats.—*Mr. R. Howse*.3. A. PELLUCIDA, *n. sp.*

Body cylindrical; sub-conic or nearly flat when contracted, spreading at the base; tentacles thirty or upwards, set in about three rows, the inside ones longest; the outer rather short; the whole animal pellucid white, without markings. Diameter $\frac{1}{4}$ inch.

On old crusted shells of *Fusus antiquus* from deep water, Cullercoats.—*J. A.* From the five-men boats.—*Mr. R. Howse*.

This little *Actinia*, which is distinguished by the absence of all colour or markings, has occurred to me two or three times at Cullercoats, on old shells, nestling amongst the serpulæ and barnacles with which they were covered. It is so inconspicuous, when contracted, as to elude observation, and it was not till the shells had been some time in sea-water, and the *Actinia* became expanded, that its presence was detected. A specimen kept in a vase was very restless, shifting its place continually, and often changing form. The species comes near to the *A. candida* of Mr. Gosse, but, perhaps, nearer still to the *A. pallida*, described in a recent number of the "Annals of Natural History," by Mr. Holdsworth. The absence of the markings at the base of the tentacles, which appear to form a distinguishing character in these two species, has induced me to consider it distinct from either.

Its smaller size and deep-water habitat strengthen this view. Mr. Howse, however, informs me that he has met with it of rather larger size than above described, and occasionally with a few opaque white lines. These may be occasioned by the edges of the septa appearing through.

* * * *Bunodes*, Gosse.

4. A. CORIACEA, *Cuv.*

Johns. Brit. Zooph., 224, t. xxxix., f. 1, 2.

In rock-pools and crevices of rocks, near low-water mark; common.

5. A. CRASSICORNIS, *Müller.*

Johns. Brit. Zooph., 226, t. xl.

On shells, stones, &c., from deep water; frequent.

6. A. DIGITATA, *Müller.*

Müll. Zool. Dan., v. 4, p. 16, t. cxxxiii.

On shells from deep water; apparently not rare.

This Actinia was first distinguished on our coast by Mr. R. Howse, who procured it from the deep-water fishing boats, and I have since got it occasionally from the same source, and once or twice at Cullercoats. It is very coriaceous and warty, from an inch to an inch and a-half in diameter, of a scarlet-orange colour with paler warts; and with numerous stout tentacles of a dull red, unbanded, but a little darker towards the tips,

* * * * *Actinoloba*, Blainville.

7. A. DIANTHUS, *Ellis,*

Johns. Brit. Zooph., 233, t. xliii.

On stones and shells from deepish water, occasionally brought in by the fishing boats. Mr. Henry Bell and Mr. R. Howse have found it at low-water mark at Marsden.

23. ANTHERA, *Johnston.*

1. A. TUEDLÆ, *Johns.*

Johns. Brit. Zooph., 242, wood-cut 53.

In deep water, Berwick Bay; rather rare.—*Dr. Johnston*. Cullercoats.—*J. A.* Hartlepool; occasionally.—*J. Hogg, Esq.*

Two or three entire specimens only have been met with at Cullercoats, but separate tentacles, which appear to be very readily detached, are frequently brought in on the fishing lines.

24. LUCERNARIA, *Müller*.

1. L. AURICULA, *Fab.*

Johns. Brit. Zooph., 246, wood-cuts 54, 55.

On the lesser sea-weeds, in pools near low-water mark, Cullercoats and Tynemouth; not rare.

2. L. CAMPANULATA, *Lamx.*

Johns. Brit. Zooph., 248, wood-cut 56.

On sea-weeds, near low-water mark; rare. Berwick Bay.—*Dr. Johnston*. Cullercoats and Whitley.—*A. Hancock* and *J. A.*

CLASS. POLYZOA, *J. V. Thompson*.

ORDER. INFUNDIBULATA, *Gervais*.

SUB-ORDER. CYCLOSTOMATA, *Busk*.

FAMILY. TUBULIPORIDÆ, *Johnston*.

25. TUBULIPORA, *Lamarck*.

1. T. PATINA, *Lamk.*

Johns. Brit. Zooph., 266, t. xlvii., f. 1—3.

On corallines from deepish water; frequent.

2. T. HISPIDA, *Flem.*

Johns. Brit. Zooph., 268, t. xlvii., f. 9—11.

On *Plumularia falcata*, *Carbacea papyrea*, &c.; not rare.

The variety β Johns. (*T. orbiculus*, Lamk.) is the form usually met with.

3. T. PENICILLATA, *Fab.*

Johns. Brit. Zooph., 270, t. xlviii., f. 1, 2.

Very rare; Tynemouth. Three specimens have been obtained from shell-sand.

4. T. FLABELLARIS, *Fab.*

Johns. Brit. Zooph., 274, t. xlvi., f. 5, 6.

On *Fusus Novegicus*, from deep water; rare.

5. *T. SERPENS*, *Linn.*

Johns. Brit. Zooph., 275, t. xlvii., f. 4—6.

On other zoophytes, shells, &c., from deepish water; common.

A very pretty variety is sometimes found with the branches radiating from a centre in a flower-like form. This appears to be the *T. lobulata* of Hassall.

26. *DIASTOPORA*, *Lamouroux.*1. *D. OBELIA*, *Johns.*

Johns. Brit. Zooph., 277, t. xlvii., f. 7, 8.

On *Modiola vulgaris* from deep water; frequent.

27. *ALECTO*, *Lamouroux.*1. *A. MAJOR*, *Johns.*

Johns. Brit. Zooph., 281, t. xlix., f. 3, 4.

On *Modiola vulgaris*, and other shells, from deep water; not common.

2. *A. DILATANS*, *Johns.*

Johns. Brit. Zooph., 281, t. xlix., f. 5—8.

On an old bivalve (*Tellina crassa*), from deep water, Northumberland coast.—*Profr. W. King.*

FAMILY. *CRISIADÆ*. *Milne Edwards.*28. *CRISIA*, *Lamouroux.*1. *C. EBURNEA*, *Linn.*

Johns. Brit. Zooph., 283, t. l., f. 3, 4.

On other zoophytes, and on sea-weeds, from low-water mark to deep water; common.

2. *C. DENTICULATA*, *Lamk.*

Johns. Brit. Zooph., 284, t. l., f. 5, 6.

Berwick Bay.—*Dr. Johnston.* Cullercoats.—*J. A.*

29. *CRISIDIA*, *Milne Edwards.*1. *C. CORNUTA*, *Linn.*

Johns. Brit. Zooph., 287, t. l., f. 1, 2.

On other zoophytes from deep water. Cullercoats; rather

rare.—*J. Coppin, Esq.*, and *J. A.* Common on the south coast of Durham.—*J. Hogg, Esq.*

SUB-ORDER. CHEILOSTOMATA, *Busk.*

FAMILY. EUCRATEIDÆ, *Johnston.*

30. EUCRATEA, *Lamouroux.*

1. *E. CHELATA*, *Linn.*

Johns. Brit. Zooph., 288, wood-cut 64.

Scruparia chelata, *Busk, Catal.*, 29, t. xvii., f. 2.

Parasitical on small sea-weeds, and on other zoophytes, between tide-marks and a little beyond. Bamborough; common.—*J. A.* Berwick Bay.—*Dr. Johnston.* Cullercoats.—*J. Coppin, Esq.* South coast of Durham; rare.—*J. Hogg, Esq.*

This pretty little zoophyte, which is rare at Cullercoats, and on the coast near the mouth of the Tyne, is plentiful and very fine at Bamborough, where scarcely any of the small algæ or zoophytes can be taken from the tide-pools, on which tufts of the *Eucratea* may not be found.

31. ANGUINARIA, *Lamarck.*

1. *A. SPATULATA*, *Lamk.*

Johns. Brit. Zooph., 290, t. l., f. 7, 8.

Ætea anguina, *Busk, Catal.*, 31, t. xv., f. 1.

On Corallines and Fusi on the south coast of Durham; occasionally.—*J. Hogg, Esq.*

FAMILY. GEMELLARIADÆ, *Busk.*

32. GEMELLARIA, *Savigny.*

1. *G. LORICULATA*, *Linn.*

Johns. Brit. Zooph., 293, t. xlvii., f. 12, 13.

Very abundant in the coralline zone.

Two varieties of this species occur. The one rather more rigid, darker coloured, and with the branches shorter and more numerous than the other, which is very flacid, pale, and with the terminal branches much attenuated. The former appears to be the kind figured by *Dr. Johnston*, but the latter is more common.

FAMILY. CELLEPORIDÆ, *Johnston*.33. CELLEPORA, *Fabricius*.

* Compact.

1. C. PUMICOSA, *Linn*.

Johns. Brit. Zooph., 295, t. lii., f. 1—3.

On the stems of other zoophytes, on stones and shells, and on the roots and stems of *Laminariæ*, from beyond low-water mark to deep water; common.

2. C. HASSALLII, *Johns*.

Lepralia Hassallii, Johns. Brit. Zooph., 304, t. liv., f. 3.

Cellepora Hassallii, Busk, Catal., 86, t. cix., f. 4—6.

On the stems and roots of *Laminariæ* and other sea-weeds, between tide-marks, Bamborough—*J. A.*

** Branching.

3. C. RAMULOSA, *Linn*.

Johns. Brit. Zooph., 296, t. lii., f. 4, 5.

In deep water, attached to shells; frequent.

4. C. SKENEI, *Ellis and Solander*.

Johns. Brit. Zooph., 297, t. lii., f. 6—8.

In deep water, attached to shells and zoophytes; rather rare. According to the recent researches of Professor Busk, this ought to be considered an *Eschara*.

5. C. CERVICORNIS, *Ellis and Solander*.

Johns. Brit. Zooph., 298, t. liii.

Eschara cervicornis. Busk, Catal., 92, t. cix., f. 7, and t. cxix. f. 1. Johns. in Berw. Club Proc., v. 3., p. 175.

In deep water, Embleton Bay.—*R. Embleton, Esq.*

This species is somewhat intermediate between *Cellepora* and *Eschara*, showing the characters of the latter genus in the young branches. The genera appear to run into each other and should be placed together. The order of arrangement in "British Zoophytes" is here adopted for convenience of reference.

FAMILY. MEMBRANIPORIDÆ, *Busk*.34. LEPRALIA, *Johnston*.1. *L. BRONGNIARTII*, *Aud.*

Lepralia tenuis, Johns. Brit. Zooph., 303, t. liv., f. 2.

Lepralia Brongniartii, Busk, Catal., 65, t. lxxxii., f. 1—5.

Rare. On a stone from deep water; Cullercoats.—*J. A.*

2. *L. RETICULATA*, *J. Macg.*

Johns. Brit. Zooph., 317, t. lv., f. 10.

Busk, Catal., 66, t. xc., f. 1; t. xciii., f. 1, 2; and t. cii., f. 1.

On *Fusi*, *Modiolæ*, and other shells from deep water; not rare. Cullercoats.

3. *L. CONCINNA*, *Busk*.

Busk, Catal., 67, t. xcix.

On *Fusus Norvegicus* from the deep-water boats; rare.

4. *L. VERRUCOSA*, *Esper*.

Johns. Brit. Zooph., 316, t. lvi., f. 3.

Busk, Catal., 68, t. lxxxvii., f. 3, 4, and t. xciv., f. 6.

On stones, shells, and the roots of *Laminariæ*, between tide-marks; frequent. Common at Bamborough.

5. *L. UNICORNIS*, *Johns*.

Johns. Brit. Zooph., 320, t. lvii., f. 1.

Busk in Journ. Micros. Sc., v. iv., p. 309, t. xvi., f. 3, 4?

Lepralia spinifera, Busk, Catal., 69 (part), t. lxxx., f. 5—7.

On the under side of stones in tide-pools; frequent at Cullercoats. Rare in deep water.

The beautiful silvery-white variety mentioned by Dr. Johnston is the one usually met with. Professor Busk, who united this species with *L. spinifera*, in his British Museum Catalogue, has since separated them again in the Journal of Microscopical Science.

6. *L. TRISPINOSA*, *Johns.*

Johns. Brit. Zooph., 324, t. lvii., f. 7.

Busk, Catal., 70, t. lxxxv., f. 1, 2; t. xcvi.; and t. cii., f. 2.

Common on shells and stones from deep water.

A very curious variety of this species is sometimes found completely covering a shell of *Fusus antiquus* with a thickish yellow crust, swelling up at pretty regular intervals into little bosses or tubercles. The cells in these parts are irregularly heaped together, and often rise perpendicularly, somewhat in the manner of a *Cellepora*.

7. *L. COCCINEA*, *Abildg.*

Johns. Brit. Zooph., 322, t. lvii., f. 2, 3.

Busk, Catal., 70, t. lxxxviii.

On the roots of *Laminaria digitata*, on stones, &c., at and beyond low-water mark; frequent.

8. *L. LINEARIS*, *Hassall.*

Johns. Brit. Zooph., 308, t. liv., f. 11.

Busk, Catal., 71, t. lxxxix., f. 1—3.

On shells and stones from deep water; common.

9. *L. CILIATA*, *Linn.*

Johns. Brit. Zooph., 323, t. lvii., f. 4, 5.

Busk, Catal., 73, t. lxxiv., f. 1, 2, and t. lxxvii., f. 3—5.

On stones and shells from low-water mark to deep water, but not common. Frequent on the littoral variety of *Modiola vulgaris* at Bamborough.

10. *L. VARIOLOSA*, *Johns.*

Johns. Brit. Zooph., 317, t. lv., f. 8, 9.

Busk, Catal., 75, t. lxxiv., f. 3—5, and t. lxxv.

On stones from the coralline zone; rather rare. Cullercoats.

11. *L. NITIDA*, *Fab.*

Johns. Brit. Zooph., 319, t. lv., f. 11.

Busk, Catal., 76, t. lxxvi. f. 1.

Rare. "Berwick Bay* on *Patella cærulea*."—*Dr. Johnston*.

12. *L. BISPINOSA*, *Johns.*

Johns. Brit. Zooph., 326, t. lvii., f. 10.

Busk, Catal., 77, t. lxxx., f. 1—4.

"On *Modiola vulgaris* from Berwick Bay."—*Dr. Johnston*.

13. *L. PEACHII*, *Johns.*

Johns. Brit. Zooph., 315, t. lv., f. 5, 6.

Busk, Catal., 77, t. lxxxii., f. 4, and t. xcvi.

Lepralia immersa, Johns. Brit. Zooph., 325, t. lvii., f. 8.

Common on stones and shells from near low-water mark to deep water. The variety *immersa* is more frequent in deep water.

14. *L. VENTRICOSA*, *Hassall.*

Johns. Brit. Zooph., 305, t. liv., f. 5.

Busk, Catal., 78, t. lxxxii., f. 5, 6; t. lxxxiii., f. 5; and t. xci., f. 5, 6.

On *Fusus antiquus* from deep water; rare. Cullercoats.—*J. A.*

15. *L. PUNCTATA*, *Hassall.*

Johns. Brit. Zooph., 312, t. lv., f. 1.

Busk, Catal., 79, t. xc., f. 5, 6; t. xcii., f. 4; and t. xcvi., f. 3.

On the underside of stones in tide-pools; common. Rare in deep water.

* Dr. Johnston considered Berwick Bay to extend southwards to Bamborough: species to which this locality are assigned may, therefore, be fairly considered within the limits of our Catalogue.

16. *L. PALLASIANA*, *Moll.**Lepralia pediostoma*, Johns. Brit. Zooph., 315, t. lv., f. 7.*Lepralia Pallasiana*, Busk, Catal., 81, t. lxxxiii., f. 1, 2.

On stones and shells between tide-marks, Bamborough and Cullercoats; rather rare.

17. *L. MALUSII*, *Aud.**Lepralia biforis*, Johns. Brit. Zooph., 314, t. lv., f. 4.*Lepralia Malusii*, Busk, Catal., 83, t. ciii., f. 1—5.

On shells and stones from deep water; occasionally. Holy Island and Cullercoats.

18. *L. GRANIFERA*, *Johns.*

Johns. Brit. Zooph., 309, t. liv., f. 7.

Busk, Catal., 83, t. lxxvii., f. 2, and t. xcv., f. 6, 7.

“On slaty rocks, in front of the coves of Holy Island, and in Berwick Bay.”—*Dr. Johnston*. On *Modiola vulgaris*, between tide-marks at Bamborough; not rare.—*J. A.*

19. *L. HYALINA*, *Linn.*

Johns. Brit. Zooph., 301, t. liv., f. 1.

Busk, Catal., 84, t. lxxxii., f. 1—3; t. xcv., f. 3—5; and t. ci., f. 1, 2.

Very common on the roots and stems of *Laminaria digitata* and other *Fuci*, on stones, &c., between tide-marks, and in shallow water.

35. *MEMBRANIPORA*, *Blainville.*1. *M. MEMBRANACEA*, *Linn.**Flustra membranacea*, Johns. Brit. Zooph., 348, t. lxvi., f. 1—3.*Membranipora membranacea*, Busk, Catal., 56, t. lxviii., f. 2.

On the fronds of *Laminaria digitata* and other sea-weeds; common.

2. *M. PILOSA*, *Linn.*

Johns. Brit. Zooph., 327, t. lvi., f. 6.

Busk, Catal., 56, t. lxxi.

Investing the stems of small sea-weeds, on Laminariæ, shells, &c., between tide-marks, and in shallow water; very abundant. More rare in deep water.

3. *M. LINEATA*, *Linn.* Pl. VIII., fig. 1, 1*a*.

Cells oval; the margin with 4 or 5 spines on each side, bending inwards, generally rather slender and not flattened at the sides. Ovicapsule large, galeate, slightly frosted, with an arched rib near the top. Avicularia sessile or a little elevated, situated on one or both sides of the ovicapsule, more rarely at the top; and sometimes at the bottom of the cell.

Flustra lineata, Linn. Syst. Nat., 12th Ed., 1301.

„ Johns. Brit. Zooph., 349 (part).

Membranipora lineata, Busk, Catal., 58, t. lxi.

On shells, &c., from within tide-marks to deep water; common. Frequent on *Patella laevis*.

It is difficult to say whether this is the *Flustra lineata* of Linnaeus, or whether, as is probable, he included more than one species under that name; but as he mentions only 8 spines, and the allied species, as here distinguished, have more, this may fairly be taken as the type, the more especially as it is certainly the *M. lineata* of Professor Busk, the only author whose figure can be recognised with certainty.

4. *M. SPINIFERA*, *Johns.* Pl. VIII., fig. 2, 2*a*.

Cells oblong-oval; the margin with numerous stout, linear or subclavate spines, about 7 on each side, erect or leaning inwards. Ovicapsule seldom present, shallow, smooth, with two or more spines? Avicularia on the top of club-shaped spines, developed sparingly on any part of the margin of the cell.

Flustra spinifera, Johns. in Newc. N. H. S. Trans., v. 2, p. 266, t. ix., f. 6.

Flustra? lineata, Johns. Brit. Zooph., 349 (part).

On the under side of stones between tide-marks; frequent.
More rarely in shallow water.

This species was described by Dr. Johnston, under the above name, in the Transactions of the Newcastle Natural History Society, but he afterwards united it with the *Flustra lineata* in his "British Zoophytes." It appears, however, to have well marked distinguishing characters. It spreads over stones in yellowish brown, coriaceous or slightly calcareous patches, of irregular outline and thickly set with spines. Old specimens are often a good deal obscured by grains of sand, or other extraneous substances. The cells are closely set, and more elongated than in *M. lineata*, and the spines, which are frequently opaque, are stouter and more numerous. But what more particularly distinguishes *M. spinifera* is that some of the spines bear an avicularium near the top. Such spines are more or less broadly clavate or fusiform, with a pointed apex, below which, on one side, is the avicularium, with a mandible opening downwards; sometimes it is on the extreme apex. This peculiarity appears to have hitherto escaped notice. The avicularia are rather rare, but may generally be detected on some part of a specimen that has not been injured. They adhere less closely than the other spines, and are more readily rubbed off. The ovicapsules are seldom developed, and when present are so inconspicuous as to be with difficulty recognised. They appear to be smooth and very shallow, with a rib across the front, and two or more spines on the top.

5. *M. CRATICULA*, *n. sp.* Pl. VIII., fig. 3, 3a.

Cells in linear series, small, oval; the margin with 5 to 7 spines on each side, which are slining, flattish at the edges, and lie closely over the aperture; one or two of the uppermost spines are erect, long, and cylindrical. Ovicapsule rather small, smooth, and cylindrico-globose, with a rib across the middle. An avicularium generally at the top of the ovicapsule, sometimes at its side.

Flustra lineata, Couch, Corn. Fauna, part 3, p. 124,
t. xxii., f. 15?

On *Modiolæ* from deep water; occasionally.

This beautiful little species is smaller than the two last, and resembles a good deal some specimens of *Lepralia nitida*. It is probable, therefore, that Dr. Johnston had this form in view when he expressed a doubt of the distinctness of *M. lineata* from that *Lepralia*. The spines in this are a little flattened at the sides and glistening, like the ribs of *L. nitida*; but they, as well as the cells, are smaller than in that species, and want the mid-rib, that unites the whole into regular cell-walls. The lower spines lie close to the aperture, and converge to a point near the centre of the cell. It is distinguished from *M. lineata*, as restricted above, by the smaller size and linear arrangement of the cells, by the stouter, flatter, and more recumbent spines, and by the smaller and more cylindrical ovicapsules.

The only specimens I have procured on this coast are from deep water, but Mr. Barlee has sent me a specimen beautifully developed on a small littoral sea-weed.

6. *M. FLEMINGII*, Busk. Pl. VIII., fig. 4.

Cells ovate, broad below, with a granulated margin, partially filled in by a corneous or subcalcareous expansion, leaving a triangular aperture; spines long, 3 on each side, confined to the upper half of the cell. Ovicapsule smallish, globular, slightly frosted, generally with an arched rib near the top. Avicularia numerous, dispersed, usually one on each side of the ovicapsule, sometimes one above it, and frequently one below the aperture of the cell.

Membranipora membranacea, Johns. Brit. Zooph., 328 (part).

Membranipora Flemingii, Busk, Catal., 58, t. lxi., f. 2, and t. lxxxiv., f. 4—6.

On shells, stones, *Flustræ*, &c., from between tide-marks to deep water; common.

When developed in a sheltered situation, this species appears bristling with long spines, and is then readily recognised; but in exposed situations, and more especially in deep water, the spines are frequently wanting. In this condition it may, however, be known by the expansion which partially fill in the cells. In

deep-water specimens, this expansion is often calcareous and granulated, but more frequently it is smooth, and has a semi-transparent corneous texture. The avicularia are numerous and very variable in position, but there is generally a large one on each side of the ovicapsule, sloping outwards like a pair of ears.

7. *M. Pouilletii*, Aud. Pl. VIII., fig. 5.

Cells ovate, broadish below, rather larger than in *M. Flemingii*, and without the inner expansion; margin granulated, with a thin rim; spines 4, or sometimes 6, round the top of the cell, short, one only on each side visible below the ovicapsule. Ovicapsule large, globose or elongated, strongly granulated and occasionally perforated. Avicularia dispersed; sometimes a small one on each side of the ovicapsule.

Membranipora membranacea, Johns. Brit. Zooph., 328 (part)?

Membranipora Pouilletii, Audouin (Expl. I., p. 240), Savigny, Egypt, t. ix., f. 12.

On shells and zoophytes, especially on *Flustra foliacea*; frequent.

This species is distinguished from the last principally by negative characters. Though not quite so common as *M. Flemingii*, it is far from rare. Both are sometimes found together on *Flustra foliacea*, overlapping each other, but not intermingling. In this case a comparison between the two can readily be made. *M. Pouilletii* is distinguished by the larger size of its ovicapsules, which are more strongly frosted or granulated than in *M. Flemingii*, and often a good deal elongated; by the partial absence of spines, and by the entire absence of the expansion partly filling up the cell, which is so peculiar a feature in the latter species. For the name, and the reference to Savigny's work, I am indebted to Professor Busk, who has also kindly sent me a tracing of Savigny's figure, which fully warrants the identification.

8. *M. unicornis*, Flem. Pl. VIII., fig. 6.

Cells stout, oval; the margin granulated, with 2 spines

on each side near the top, one of which is usually covered by the ovicapsule. Ovicapsule subcylindrical, smooth, with a strong rib above the margin, and surmounted by a conical avicularium.

Flustra unicornis, Flem. Brit. Anim., 536.

Membranipora membranacea, Johns. Brit. Zooph., 328 (part)?

Lepralia squama, Daly. Rare and Rem. Anim. Scot., v. 2, p. 79, t. xxv., f. 14, 15.

On old bivalve shells, on stones, and on the test of *Ascidia sordida*; frequent.

Dr. Fleming's description of his *F. unicornis* agrees so well with this species that I have no hesitation in adopting the name, although, as is the case in most of the old descriptions of this difficult genus, more than one species may have been included under it. *M. unicornis* has the cells larger, stouter, and more regularly oval than in the two last, and wants the inner sub-corneous expansion of *M. Flemingii*. But the best distinguishing character is found in the ovicapsules, which, in this species, are smooth (never frosted), have a strong rib just above the margin, and are surmounted by a conical avicularium, giving the whole the appearance of a Phrygian bonnet. When the ovicapsule is absent, the avicularium appears as "a blunt, hollow, conical process" above the cell. I have never seen an avicularium developed in any other position in this species, as is usual in its congeners.

36. FLUSTRELLA, Gray.

1. *F. hispida*, Fab.

Flustra hispida, Johns. Brit. Zooph., 363, t. lxvi., f. 5.

Flustrella hispida, Gray, Radiated Anim. Brit. Mus., 108.

On *Fucus serratus* and other sea-weeds between tide-marks, and occasionally on stones; common.

FAMILY. CELLULARIADÆ, *Busk*.37. CELLULARIA, *Pallas*.1. C. CILIATA, *Linn*.

Johns. Brit. Zooph., 335, t. lviii., f. 1, 2.

Bicellaria ciliata, Busk, Catal., 41, t. xxxiv.

On corallines and Fuci; rare. South coast of Durham.—
J. Hogg, Esq.

2. C. TERNATA, *Ellis and Solander*.

Johns. Brit. Zooph., 335, t. lix.

Menipea ternata, Busk, Catal., 21, t. xx., f. 3—5.

On other zoophytes from the deep-water (five-men) boats;
occasionally.—*J. A.* Cullercoats; rare.—*J. Coppin, Esq.*,
and *J. A.*

3. C. SCRUPOSA, *Linn*.

Johns. Brit. Zooph., 336, t. lviii., f. 5, 6.

Scrupocellaria scruposa, Busk, Catal., 25, t. xxii. f. 3, 4.

Parasitical on other zoophytes, Laminariæ, shells, &c., from
within tidal range to deep water; common.

4. C. SCRUPEA, *Busk*.

Scrupocellaria scrupea, Busk, in Ann. Nat. Hist., 2nd
Ser., v. 7, p. 83, t. ix., f. 11, 12. Catal., 24,
t. xxi., f. 1, 2.

From the deep-water boats, a single small specimen.—*J. A.*

5. C. REPTANS, *Linn*.

Johns. Brit. Zooph., 337, t. lviii., f. 3, 4.

Canda reptans, Busk, Catal., 26, t. xxi., f. 3, 4.

On *Flustra foliacea* and other zoophytes, on Fuci and stones,
from within tide-marks to deep water; frequent.

6. C. PEACHII, *Busk*.

Cellularia neritina, var., Johns. Brit. Zooph., 340.

Cellularia Peachii, Busk, Catal., 20, t. xxvii., f. 3—5.

From the five-men boats; rare.—*J. A.* “Tynemouth.
(*C. neritina*), Miss Ellen Forster.”—*Johnston*.

38. BUGULA, *Oken*.

1. B. AVICULARIA, *Linn*.

Cellularia avicularia, Johns. Brit. Zooph., 338, t. lxiii., f. 7, 8.

Bugula avicularia, Busk. Catal., 45, t. liii.

On shells and zoophytes from deep water; occasionally.

2. B. FLABELLATA, (*J. V. Thompson, MS.*) *Gray*.

Flustra avicularis, Johns. Brit. Zooph., 346, t. lxiii., f. 3, 4.

Flustra capitata, Hogg, Nat. Hist. Stockton, 36.

Bugula flabellata, Busk, Catal., 44, t. li., lii.

On *Flustra foliacea*, shells, &c., from the coralline zone; not rare. On rocks at extreme low-water mark, Bamborough.

3. B. MURRAYANA, (*Bean, MS.*) *Johns*.

Flustra Murrayana, Johns. Brit. Zooph., 347, t. lxiii., f. 5, 6.

Bugula Murrayana, Busk, Catal., 46, t. lix.

From the fishing boats, Cullercoats; rather rare. More common from the deep-water (five-men) boats.

4. B. FASTIGIATA, *Fab*.

Polyzoary 1 to 4 inches high, stout, bushy, irregularly branched; becoming purplish or rusty red when dry: cells biserial, cylindrical, elongate, attenuated below: aperture wide above, elliptical below, with a stout, cylindrical, jointed spine at the upper and outer angle, and a denticle in front of it; no spine on the inner angle. Avicularium large, with a longish beak. Ovicapsules very shallow.

Sertularia fastigiata, Fab. Fauna Grœnl., 445.

Cellularia fastigiata, Flem. Brit. Anim., 539.

Daly. Rare and Rem. Anim.

Scot., v. 1, p. 236, t. xlvi.

Cellularia plumosa, Johns. Brit. Zooph., 341, t. lxi.

In the Laminarian zone; frequent: usually found thrown up among sea-weeds. Cullercoats, common.—*J. Coppin, Esq.* Extremely abundant on the south coast of Durham.—*J. Hogg, Esq.*

This species has been hitherto confounded with the *Cellularia plumosa* of Pallas, the "Soft Feather Coralline" of Ellis, from which it is sufficiently distinct. The latter is a delicate species, of a bright buff colour when fresh, but becoming white when dried. It is a south country form, confined, for the most part, to the south and west coasts of Britain. The present is a North Sea species, found plentifully on the north-east coast of England and Scotland, and extending to Greenland and Norway. It is robust, stiffish, and rather shrubby in growth (compared by Sir J. G. Dalyell to an aged tree in miniature), and usually opaque and umber-coloured in the old stem and branches, which throw out numerous radical fibres. The living parts are nearly colourless when fresh, but in drying assume a reddish or purplish hue. The cells are more elongated and cylindrical than in *B. plumosa* (which is accurately represented in Pl. liv., f. 1—5, of Mr. Busk's Catalogue), and have the spine much stouter, more cylindrical, and nearly always with a joint at the base. The spine in *B. plumosa* is short, and more properly homologous with a small denticle, situated outside the spine, at the extreme edge of the aperture, in *B. fastigiata*, which can generally be detected when looked for, and sometimes rises into a second spine. The avicularium is much larger than in *B. plumosa*, and the ovicapsule smaller, shallower, and set at an open angle with the top of the cell. It has a rib near the margin.

In unravelling the synonyms of this species, it is necessary to pass over the *Sert. fastigiata* of Linnaeus, which probably includes both kinds. In the *Sertularia fastigiata* of Fabricius, however, we recognise the present species from its purple colour and rigid mode of growth, as well as from its size. It may be allowable, therefore, to restrict the name *fastigiata* to this species, the more especially as it has been applied to the same form by most of the Scottish naturalists.

FAMILY. FLUSTRIDÆ, *Gray*.39. FLUSTRA, *Linnaeus*.1. F. FOLIACEA, *Linn*.

Johns. Brit. Zooph., 342, t. lxii., f. 1, 2.

Common on hard ground in a few fathoms water.

2. F. TRUNCATA, *Linn*.

Johns. Brit. Zooph., 344, t. lxii., f. 3, 4.

In the Laminarian and Coralline zones; abundant.

A variety with the ends expanded into undulating foliations, as figured by Sir John Dalyell under the name of *Flustra papyracea* (Rare and Rem. Anim. of Scotl., v. 2, t. vii.), has occurred to me once at Cullercoats. It is a curious and interesting form, arising from an abnormal growth, and the fusion of several of the terminal branchlets into one.

40. CARBASEA, *Gray*.1. C. PAPYREA, *Pallas*.

Flustra carbacea, Johns. Brit. Zooph., 345, t. lxiii., f. 1, 2.

Carbasea papyrea, Busk, Catal., 50, t. 1., f. 1—3.

From deep water; frequent.

41. ESCHARA, *Ray*.1. E. FOLIACEA, *Ellis and Solander*.

Johns. Brit. Zooph., 350, t. lxvii.

From deep water, Embleton Bay; rare.—*R. Embleton, Esq.*

South coast of Durham.—*J. Hogg, Esq.*

2. E. CRIBRARIA, *Johns*.

Johns. Brit. Zooph., 352, t. lx., f. 7—9.

Busk in Journ. Micros. Scien., No. 16 (1856), 311, t. xii., f. 1—3.

From the deep-water fishing boats; occasionally. Berwick Bay, in 35 fathoms.—*Dr. Johnston*. Northumberland coast.—*A. Hancock, Esq.*; *Prof. W. King*; and *J. A.*

The two largest specimens figured in the Journal of Microscopical Science are in the Newcastle Museum. The only British examples of this species yet known appear to have been got on our coast. Mr. A. Hancock has a small specimen on a *Margarita* from Davis' Straits.

42. RETEPORA, *Lamarck*.

1. R. BEANIANA, *King*.

Johns. Brit. Zooph., 353, wood-cut 67.

From the deep-water fishing boats.—*Prof. King*. Dredged in 60 fathoms off the coast of Durham.—*Mr. R. Howse*. From deep water, Embleton Bay.—*R. Embleton, Esq.* The specimens got by Mr. Embleton are remarkably fine.

FAMILY. SALICORNARIADÆ, *Busk*.

43. SALICORNARIA, *Cuvier*.

1. S. FARCIMINOIDES, *Ellis and Solander*.

Johns. Brit. Zooph., 355, t. lxvi., f. 6, 7.

On shells, &c., from deep water; frequent.

2. S. SINUOSA, *Hassall*.

Johns. Brit. Zooph., 356, t. lxvi., f. 8.

Dredged off Whitburn in about 20 fathoms water.

The claims of this species to be considered distinct from *S. farciminoides* have hitherto been much disputed. Dr. Johnston, though he admitted it into the second edition of "British Zoophytes," leaves the question undecided, correctly remarking, that "the real specific distinctness of the species is undetermined." Professor Busk rejected it in his "Catalogue of Marine Polyzoa," on the authority of the British Museum specimens, considering them to be typical—of which, however, there may be some doubt. The fact is, that the characters originally fixed upon to distinguish the species do not prove to be permanent, and later observers, finding these to be fallacious, have consequently rejected it. I have, therefore, found it necessary to subject both kinds to a careful re-examination. The result has

confirmed me in the belief that they are really distinct species. The best character is found in the avicularium, "the form and position of which," Mr. Busk remarks, "afford apparently an invariable character, readily discernible, and sufficient as a specific distinction."* The avicularium of *S. farciminoides* is semicircular and arched upwards; that of *S. sinuosa* is triangular, pointing downwards, and always sloping a little to one side. In addition to this, the form of the under lip of the cell differs in the two species: in *S. farciminoides* it is slightly arched in the centre; in *S. sinuosa* it is quite straight, and rather projecting, with a sinus at each end. The form of the cells, though variable, is more inclined to the rhomboidal or lozenge shape in *S. farciminoides*, and to the hexagonal or octagonal in *S. sinuosa*. The arched top is found in young specimens of both. Upon the whole I think there cannot be a doubt of the distinctness of the two species, and I am glad to find that Professor Busk now coincides with me in this opinion.

SUB-ORDER. CTENOSTOMATA, *Busk*.

FAMILY. ALCYONIDIADÆ, *Johnston*.

44. ALCYONIDIUM, *Lamouroux*.

1. A. GELATINOSUM, *Linn*.

Johns. Brit. Zooph., 358, t. lxviii., f. 1—3.

Attached to old shells and stones in the Laminarian and Coralline zones; frequent. On the sides of rocks at low-water mark, Bamborough.

2. A. HIRSUTUM, *Flem*.

Johns. Brit. Zooph., 360, t. lxix., f. 1, 2.

On *Corallina officinalis* and other sea-weeds between tide-marks and in shallow water; common.

At Cullercoats and on the adjacent coast, this species is of very humble growth, seldom exceeding one or two inches in height, and very slightly lobed—often, indeed, a mere crust, not rising into a free state; but in the north of Northumberland it reaches a much larger size, and becomes much lobed

* Catal. Mar. Pol., p 16.

and palmated. At Bamborough I have obtained it five or six inches in height and nearly as much in breadth. The largest specimens appear to grow beyond low-water mark.

Dr. Johnston has, I think, made a mistake in stating that the papillæ of this species are "each the cell of a polype." They are imperforate, and much more numerous than the polype-cells, which are disposed among them in the same manner as is represented in the figure of *Cycloum papillosum*, given in "British Zoophytes" (Pl. lxx., fig. 1). This figure has the appearance of having been taken from a specimen of *A. hirsutum* in its encrusting state.

3. *A. PARASITICUM*, *Flem.*

Johns. Brit. Zooph., 362, t. lxxviii., f. 4, 5.

On *Plumularia falcata* and other zoophytes from deepish water; common.

4. *A. MAMMILLATUM*, *n. sp.* Pl. V., f. 3, 4.

Encrusting, semitransparent, brownish, covered with rather long, stout, and strongly wrinkled papillæ, from which the polypides issue: tentacles sixteen or eighteen.

On old shells from deep water; not uncommon.

When carefully examined, this species can readily be distinguished from any of those previously described by the greater size and elevation of the papillæ, which, although varying much in length according to their state of contraction, are always sufficiently prominent to be easily recognised. When most contracted, they appear like strong mammillæ, but their more usual form, when the polypide is withdrawn, is elongate-conical; when it is expanded, they are cylindrical and nearly linear. This species is parasitical on old univalve shells from deep water, which it envelopes with a subcoriaceous crust, never rising into a free state. No septa are visible excepting in the margin of young specimens, or when examined as a transparent object in the microscope.

5. *A. ALBIDUM*, *n. sp.* Pl. V., figs. 5, 6.

Encrusting, semitransparent, yellowish white; general envelope inconspicuous; polypides prominent, ventricose, flask-shaped, sub-recumbent, becoming erect towards the aperture, which is truncated when contracted; tentacles, 18.

Surrounding the stem of *Plumularia falcata* in small patches; from the deep-water fishing boats; rare.—*J. A.*

This species looks somewhat like a cluster of separate animals, the polypides being prominent and united to each other by narrow septa. When the polypide is extended it is columnar, tapering a little upwards, and expanding into a slight ridge below the fasciculated sheath of setæ. It may be doubted whether the specimens examined were in an adult state.

6. *A. HEXAGONUM*, *Hincks*.

Alcyonidium mytili, Daly. Rare and Rem. Anim. Scot., v. 2, p. 36, t. xi.?

Alcyonidium hexagonum, Hincks, in Journ. Micros. Sc., No. 19.

On stones and shells from between tide-marks to deep water; frequent.

It is possible that more than one species may be here included under the above name. The *Alcyonidia* of our coast have been very imperfectly investigated. All that can be said at present is that one species at least, resembling in its character the *A. hexagonum* of Hincks and *A. mytili* of Dalyell, is not uncommonly met with on stones within tide-marks, as well as on shells and other substances from deep water. It has not yet been observed upon sea-weeds.

7. *A. POLYUUM*, *Hassall*?

Sarcochitum polyoum, Johns. Brit. Zooph., 365, t. lxxi.?

On the underside of stones in tide-pools, with the last; frequent.

This species is frequently found on the same stone with the last, from which it differs in being thicker and of more gelatinous

consistency, in its dark brown colour, and in its not having the septa visible even when dried. It answers tolerably well to the description of *Sarcochitum polyourum*, Hassall; and, therefore, in the present uncertain state of the species, I have thought it best to consider it such, rather than to introduce a new name. It does not appear to differ generically from the other encrusting *Alcyonidia*; but should it be considered necessary to divide these from the branching kinds (most of which, however, are encrusting in their young state), the name of *Sarcochitum* might be adopted for the group.

FAMILY. VESICULARIADÆ, *Johnston*.

45. SERIALARIA, *Lamarck*.

1. S. LENDIGERA, *Linn*.

Johns. Brit. Zooph., 368, wood-cut 68.

On Fuci and zoophytes from low-water mark to deep water; not rare.

46. VESICULARIA, *J. V. Thompson*.

1. V. SPINOSA, *Linn*.

Johns. Brit. Zooph., 370, t. lxxii., f. 1—4.

“Rarely found near Hartlepool.”—*J. Hogg, Esq.* Cullercoats, a single specimen.—*J. A.*

47. BUSKIA,* *nov. gen.*

Polypoary corneous, consisting of a slender, tubular, creeping fibre, with cells developed at intervals. Cells ovate, adhering throughout, generally with lateral spine-like processes, also adhering; orifice terminal and circular. Polypide with eight tentacles, issuing from a sheath of fasciculated setæ.

1. B. NITENS, *n. sp.* Pl. V., figs. 1, 2.

Minute, horn-coloured, shining: creeping fibre, filiform,

* This genus is dedicated to Prof. Busk, who has done more towards the illustration of the *Polypoa* than any other individual.

branching or anastomosing, with occasional short, spinous offsets: cells ovate or flask-shaped, rather ventricose, tapering towards the orifice, the margin of which is thickened and slightly nodulous; sides of the cells produced into irregular, flattened spines, adhering to the substance on which it creeps.

On *Plumularia falcata*, *Companularia dumosa*, &c., from deep water; rather rare.—*J. A.* On a stone at low-water mark, Whitley.—*J. Coppin, Esq.*

This interesting little zoophyte has probably hitherto escaped observation from its minuteness. The processes at the sides give the cells an insect-like appearance: they are irregular and occasionally wanting. The cells are also subject to some variation in form, especially in the size of the aperture: they lie nearly parallel to the stem, which frequently divides and runs along each side of them, clasped by the lateral processes. The animal, when exerted, extends considerably beyond the cell, and has eight shortish and rather stout tentacles.

48. VALKERIA, *Fleming*.

1. *V. UVA*, *Linn.*

Johns. Brit. Zooph., 375.

In tide-pools, on *Corallina officinalis*; frequent.

49. BOWERBANKIA, *Farre*.

1. *B. IMBRICATA*, *Adams*.

Johns. Brit. Zooph., 377, t. lxxii., f. 5, 6.

β. *Bowerbankia densa*, Farre in Philos. Trans., An. 1837, p. 391, t. xx., xxi.

In tide-pools, on *Corallina officinalis*; frequent.

The *Bowerbankia* usually found on our coast is the *densa* of Farre, which, in deference to the opinion of others, is here ranked as a variety, though I am inclined to think it a distinct species. Independently of habit and mode of growth, it is difficult to get a character to distinguish the species of this genus, or of *Valkeria*. *B. densa* grows in small compact tufts in rock-pools, about half-tide level, principally on *Corallina officinalis*;

never rising from its support or sending off free shoots. At extreme low water mark, at Cullercoats, a *Bowerbankia* is found of a more lax mode of growth, sending off free shoots, and having the cells a little more elongated and slender. This I take to be a depauperated form of the true *B. imbricata*, though it never assumes the luxuriant branched state seen in south-country specimens.

50. FARRELLA, *Ehrenberg*.

1. *F. PEDICILLATA*, *n. sp.* Pl. VI.

Body ovate-oblong, yellowish, transparent, with long and very slender pedicles, uniform in thickness throughout, arising from a creeping fibre; tentacles 12. Length of cell $\frac{1}{30}$ th in.

On old shells of *Buccinum undatum* and *Fusus antiquus*, from deep water; not uncommon.—*J. A.*

This species differs from the *Laguncula* (*Farrella*) *elongata* of Van Beneden in the great length and slenderness of the pedicle, which is usually two or three times the length of the cell, and does not enlarge towards the top, as in the latter species. The cells are rather narrower above than in *F. elongata*, and the number of tentacles does not exceed twelve in any of the specimens that I have examined. The animal, as seen through the transparent cell-walls, is of a pale yellow colour, with a brownish red patch, indicating the position of the stomach. The ovaries are white. The base of the cell is finely wrinkled, and at its junction with the pedicle it forms a kind of joint, which can be more or less twisted at the will of the animal.

51. AVENELLA, *Dalyell*.

Body elongate-cylindrical, opaque, sessile, arising from a creeping fibre; tentacles numerous (20 to 30); gizzard?

This genus differs from its allies (*Farrella*, *Bowerbankia*, and *Valkeria*) in the opacity of its cell-walls, and in the greater number of tentacles. It also differs from *Farrella*, in being sessile.

1. *A. FUSCA*, *Daly*.

Dalyell, Rare and Rem. Anim. Scot., v. 2, 65; v. 1, t. xii., f. 11.

Farrella fusca, Busk, in Journ. Microsc. Sc., t. vi., f. 3.

On *Flustra truncata* and *Plumularia Catherina*, from the coralline zone, Cullercoats.—*J. A.*

This species is of an opaque ochre-yellow colour when fresh, but changes to a blackish brown by exposure to the air. The name of *fusca* does not, therefore, well characterise it in its living state. The tentacles (20 in number) have an opaque white line down the centre.

SUB-ORDER. PEDICELLINEA, *Gervais*.FAMILY. PEDICELLINIDÆ, *Johnston*.52. PEDICELLINA, *Sars*.1. *P. ECHINATA*, *Sars*.

Johns. Brit. Zooph., 382, t. lxx., f. 5.

On small sea-weeds and corallines, near low-water mark; frequent.

A minute *Pedicellina* with a smooth stem, apparently distinct from this, was observed on a stone from a tide-pool at Cullercoats. It is probably the *P. gracilis* of Sars, but from its position and small size, its characters could not be distinctly ascertained.

ORDER. HIPPOCREPIA, *Gervais*.FAMILY. PLUMATELLIDÆ, *Allman*.53. ALCYONELLA, *Lamarck*.1. *A. STAGNORUM*, *Lamk*.

Johns. Brit. Zooph., 391, t. lxxiv.

In Howick pond.—*R. Embleton, Esq.* Crag Lake.—*A. Hancock, Esq.*

54. PLUMATELLA, *Bosc*.1. *P. REPENS*, *Linn*.

Johns. Brit. Zooph., 402, wood-cut 76.

Not unfrequent in a rivulet of beautifully clear water, at Norton, near Stockton: observed in 1837.—*J. Hogg, Esq.*

2. *P. PUNCTATA*, *Hanc.*

Hancock, in Ann. Nat. Hist., 2nd Ser., v. 5, p. 200;
and Trans. Tynes. Club, v. 1, p. 400, t. vi., f. 6,
7, and t. iv., f. 1.

In Bromley and Crag Lakes, Northumberland.—*A. Hancock.*

3. *P. ALLMANI*, *Hanc.*

Hancock, in Ann. Nat. Hist., 2nd Ser., v. 5, p.
200; and Trans. Tynes. Club, v. 1, p. 401, t. vi.,
f. 3—5; and t. iv., f. 2, 3.

In Bromley Lake; rather abundant.—*A. Hancock.*

55. *FREDERICELLA*, *Gervais.*1. *F. SULTANA*, *Blum.*

Johns. Brit. Zooph., 405. *Hanc.* in Trans. Tynes.
Club., v. 1, p. 368, t. iii., f. 1, 4—6.

In Crag and Bromley Lakes; abundant.—*A. Hancock.*

FAMILY. *PALUDICELLIDÆ*, *Allman.*56. *PALUDICELLA*, *Gervais.*1. *P. PROCUMBENS*, *Hanc.*

Hancock in Ann. Nat. Hist., 2nd Ser., v. 5, p. 201;
and Trans. Tynes. Club, v. 1, p. 402, t. vi., f. 1, 2.

In Bromley and Crag Lakes, but more abundantly in the
latter.—*A. Hancock.*

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ABBREVIATIONS OF AUTHORS' NAMES.

Abildg.	Abildgaard, in Zoologia Danica.
Aud.	Audouin, in Savigny's Egypt.
Blum.	Blumenbach.
Cuv.	Cuvier.
Daly.	Dalyell.
Ehr.	Ehrenberg.
Fab.	O. Fabricius.
Flem.	Fleming.
Forsk.	Forskæl.
Hanc.	A. Hancock.
Hass.	Hassall.
Johns.	Johnston.
Lamk.	Lamarck.
Lamx.	Lamouroux.
Linn.	Linnaeus.
Müll.	Müller.
Macg.	J. Macgillivray.
Van. Ben.	Van Beneden.

EXPLANATION OF THE PLATES.

PLATE I.

- Figs. 1, 2. Vorticlava humilis*, natural size and magnified.
 3. A tentacle of the lower row, much enlarged.
 4. Ditto of the upper row ditto.
 5, 6. *Eudendrium confertum*, natural size and magnified.
 7. A polypary of the same, magnified.
 8. A tentacle, contracted and very highly magnified.
 9, 10. *Eudendrium capillare*, natural size and magnified.
 11. A polype of the same, more highly magnified.
 12. Reproductive capsule (sperm-capsule?), more highly magnified.

PLATE II.

- Figs. 1, 2. Sertularia tricuspidata*, natural size and magnified.
 3, 4. *Sertularia tenella*, natural size and magnified.
 5. Ovicapsule of the same.
 6. A polype-cell, showing the operculum.
 7. *Campanularia volubilis*, highly magnified.
 8. *Campanularia Johnstoni*, ditto.
 9. *Campanularia Hincksii*, ditto.

PLATE III.

- Figs. 1, 2. Laomedea neglecta*, natural size and magnified.
 3. A cell of *Laomedea gelatinosa*, Pallas.
 4. Two cells of *Laomedea longissima*, Pallas.
 5. *Laomedea acuminata*, natural size.
 6, 7. The same, highly magnified, with the polype in different states of expansion.
 8. The same with the polype withdrawn.

PLATE IV.

- Fig. ... 1. *Grammaria ramosa*, natural size.
2. Another specimen, magnified.
3. A portion of the same, more highly magnified.
4. A section of the stem of the same.
5. *Campanularia gracillima*, natural size.
6. A portion of the same, magnified.

PLATE V.

- Fig. ... 1. *Buskia nitens*, highly magnified.
 2. Two cells of the same, the upper one showing the sheath of setæ.
 3, 4. *Alcyonidium mammillatum*, natural size and magnified.
 5, 6. *Alcyonidium albidum*, natural size and magnified.

PLATE VI.

- Fig. ... 1. *Farrella pedicellata*, highly magnified.
2. A cell, more highly magnified.
3. The same, with the tentacles expanded.

PLATE VII.

- Figs. 1, 2. Coryne (pelagica), natural size and magnified.*
3. A group of Tubularia implexa, natural size.
4. A single polypary of the same, slightly magnified.
5. The same, highly magnified.
6. A portion of the same, showing the two coats of the tube.
7, 8. Corymorpha nana, natural size and magnified.

PLATE VIII.

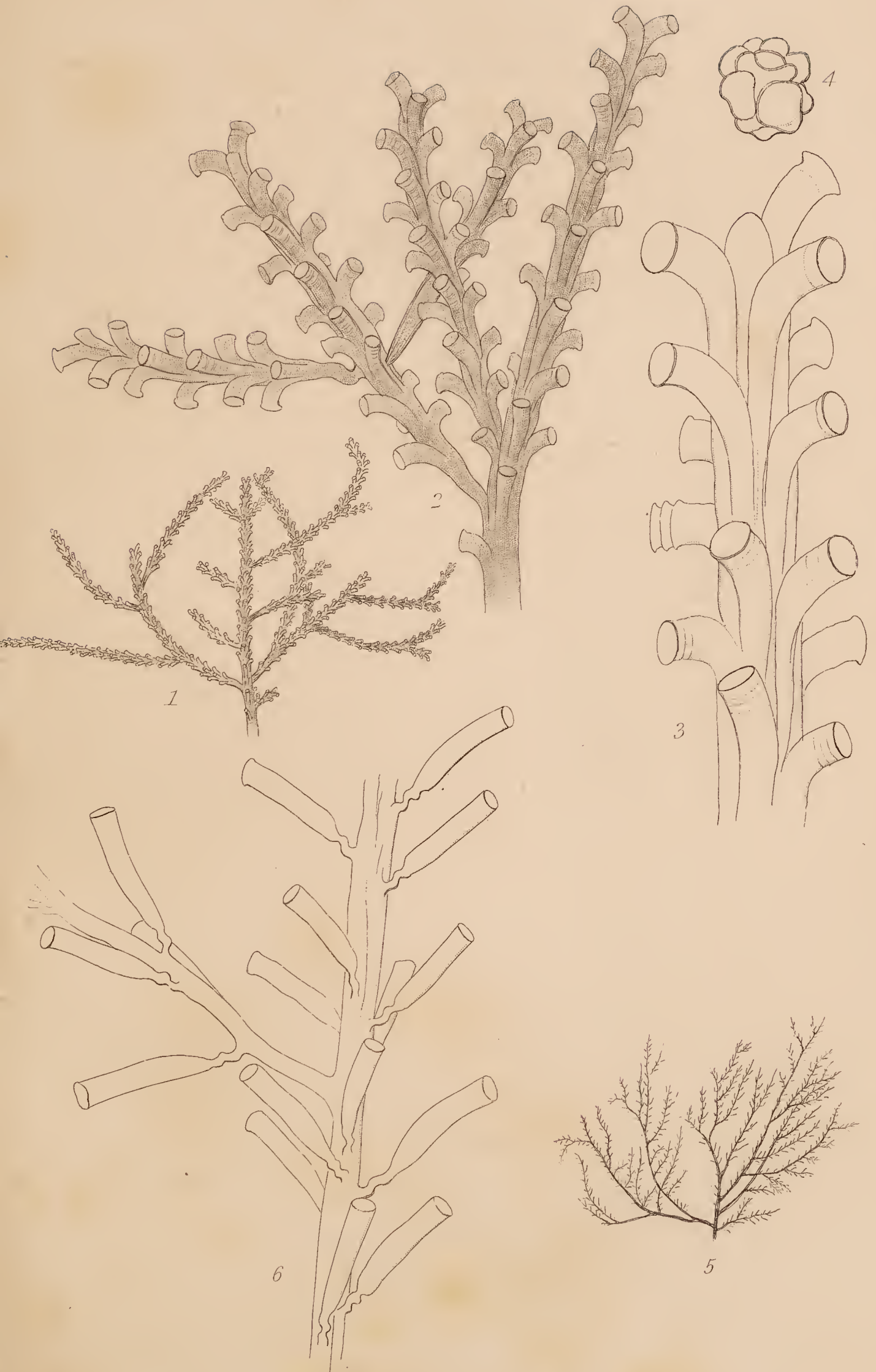
- Fig.* ... 1. *Membranipora lineata*, a few cells highly magnified, 1*a*, a spine.
 2. ————— *spinifera*, ditto 2*a*, two spines,
 one bearing an avicularium.
 3. ————— *craticula*, a few cells highly magnified, 1*a*, a spine
 from the lower part of the cell.
 4. ————— *Flemingii*, highly magnified. ...
 6. ————— *unicornis*, ditto.











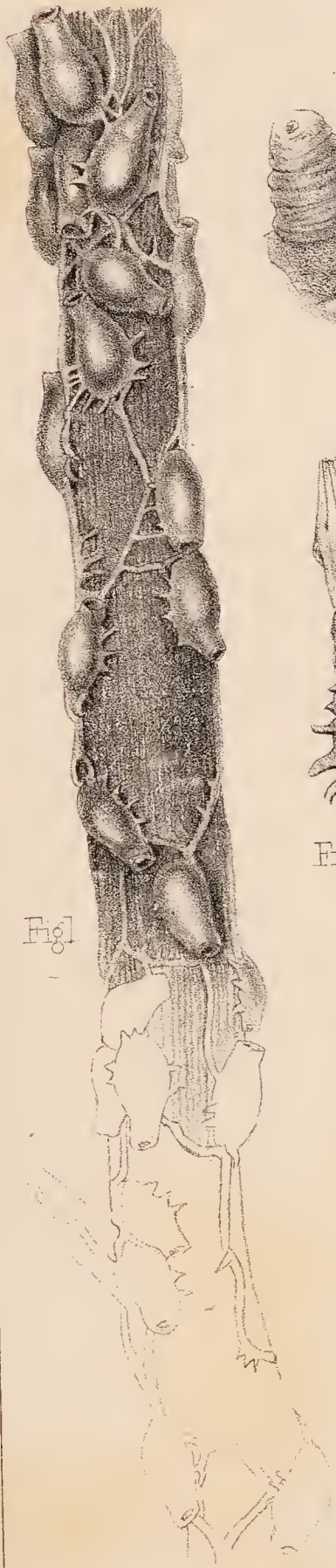


Fig 1.

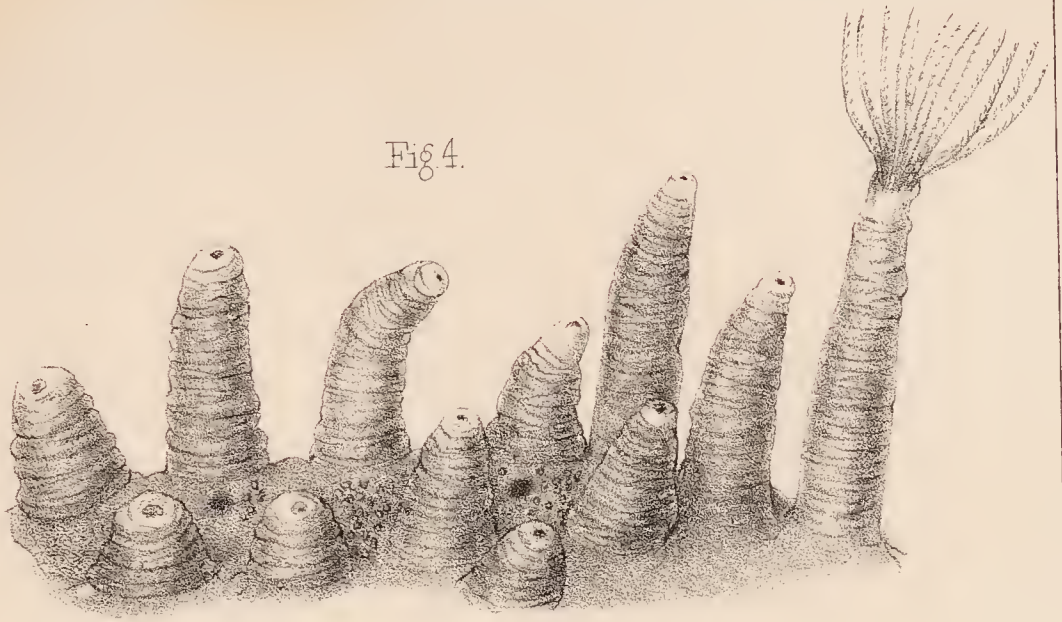


Fig 4.



Fig 2.

Fig 3.

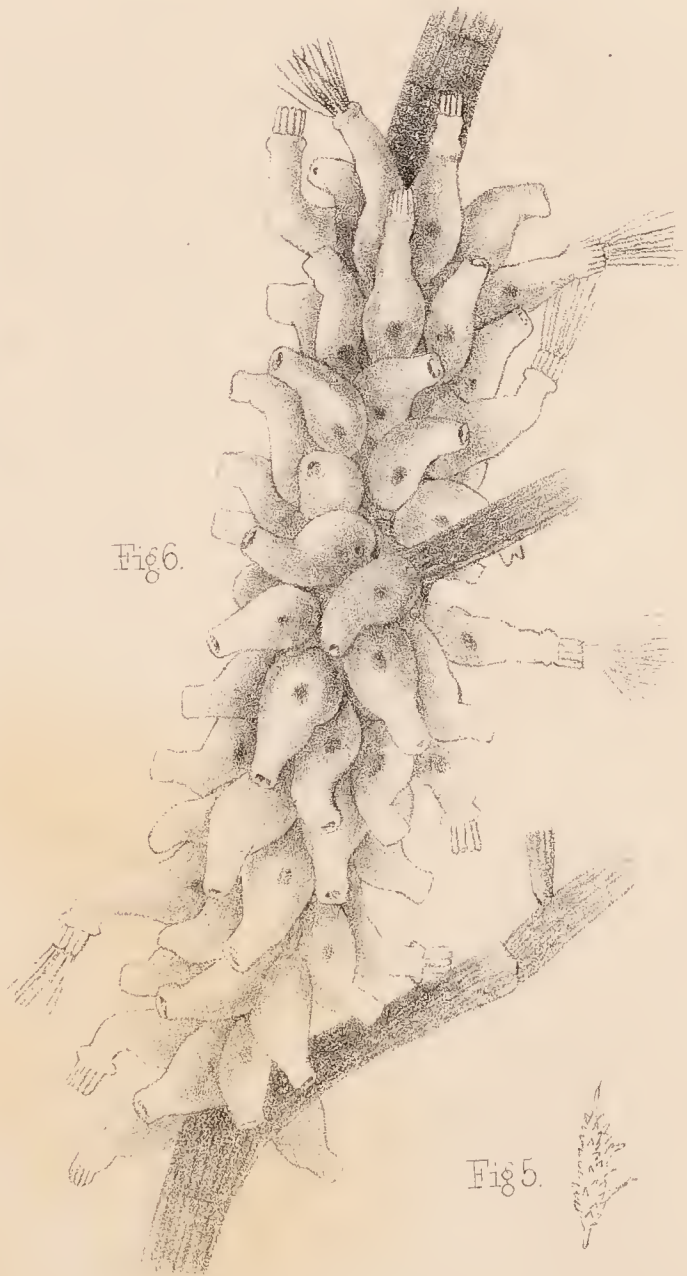


Fig 6.

Fig 5.

Plate VI.

Fig1.



Fig2.



Fig3.



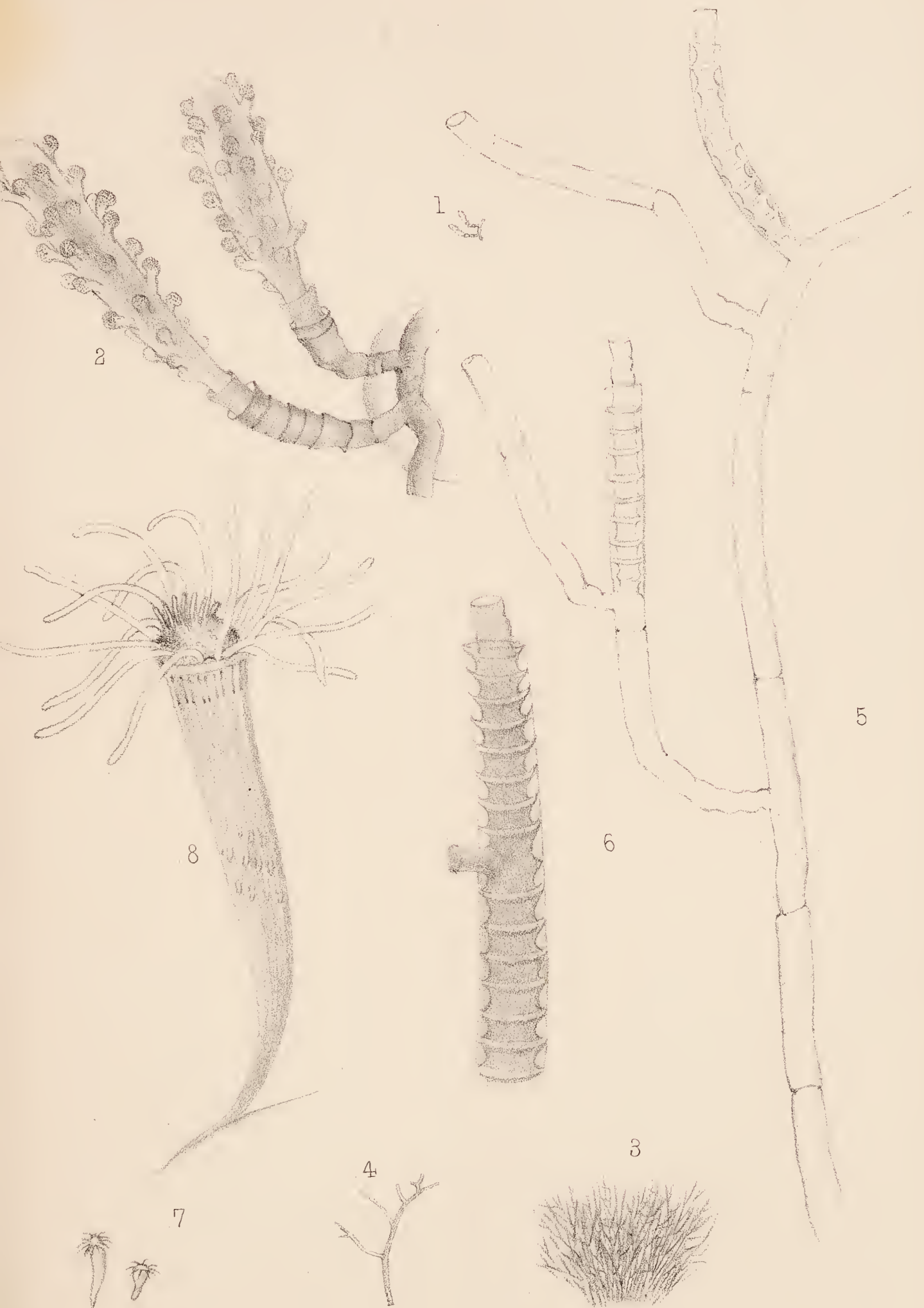


Plate VIII



1

1^a



2^a

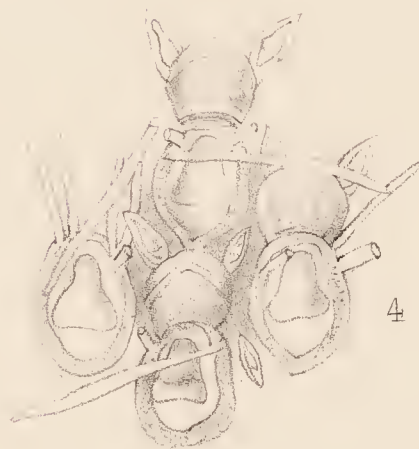


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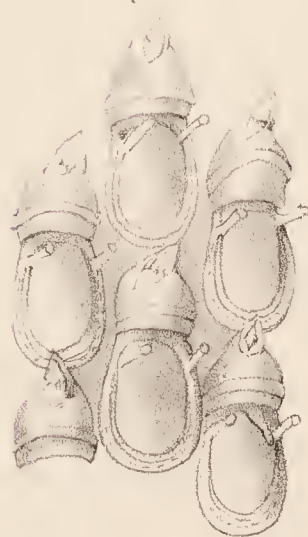
3^a



4



5



6

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